

A PATTERN FOR THE COST-BENEFIT ANALYSIS PROCEDURE USED IN INVESTMENT PROJECT MANAGEMENT

Elena DOVAL¹

Abstract: *The organization, region or country development depends on the level of investment which has the impact on the revenue volume and the new jobs creation at least. The main problems related to investment projects that the management is often facing are the project financing source finding and the benefit-cost ratio analysis (CBA). Even if the literature offers several guides to write a project, the managers still encounter some constraints in doing this work. After a briefing about the CBA's history and its importance in projects evaluation, this paper is concerned on identification of the main difficulties of an investment project that might determine the managers to be skeptical in preparing the projects and to describe a pattern of a procedure to be followed in practice to facilitate the benefit-cost analysis.*

Keywords: investment project management; investment project evaluation; investment decision making; financial CBA; externalities; economic CBA; CBA procedure pattern

JEL Classification: G11, G17, H23, H43, H68, M19, O44, Y10

1. Introduction

All projects, especially the investments projects, need to be related to the internal and external organization's environmental factors by "exploring practice and distributed knowledge through interaction" (Bosch-Sijtsema, P.M. & Henriksson, L-H., 2014).

The cost-benefit analysis (CBA) became a useful tool for the project managers in order to facilitate the decision-making whether to go ahead

¹ *Spiru Haret University, Faculty of Management Brasov, Romania, email: doval.elena1@yahoo.com; mgm_elena.doval@spiruharet.ro*

with a project. The CBA technique has been introduced as a concept in 1848 by Dupuit, J. and 20 years later some economists have provided a set of rigorous rules. Because the decision could not be made separate of organization's external environment, the economic value related to social costs has been introduced by Hayami and Peterson in 1972 (Watkins, T., 2014).

CBA technique is used to evaluate different courses of action or alternatives of a project. The project manager has the possibility, by using money terms, to compare the impact of the project tangible or intangible costs against its benefits. "As such, a major advantage of cost-benefit analysis lies in forcing people to explicitly and systematically consider the various factors which should influence strategic choice" (UK Guide, 2014).

The CBA has developed in the next period of time (Roy, A., 1984; Dreze, J. & Stern, N., 1987; Heinzerling, L. & Ackerman, F., 2002; Mishan, E.J., Quah, E., 2007; Revesz, R.L. & Livermore, M.A., 2011; Layard, R. & Glaister, S., 2012; Boardman, A. et al, 2012). The authors have reformed the technique by adding more details and explanations for a better understanding and mistakes avoidance by the project management.

This tool could be used in decision-making in several domains, such as: feasibility studies, opportunity studies, change evaluation, staff hiring in projects, training programs and others. However, this tool has become popular being imposed in the investment projects financed by EU structural funds, according to a specific guideline (EU, 2008; 2013).

Any investment project management has to relate the project to the organization's strategic objectives (Egginton, B., 2012) and to determine the return on investment (ROI) indicator, even if this is to invest in people (Phillips, J. et al, 2007), as well as to the risks the project might meet (Lester, A., 2007). Some authors are highlighting the need for combining the CBA with the multi-criteria analysis (EC, 2013, p. 18).

Usually two stages are to be considered when CBA of a project is running, such as: to value the costs and benefits every year and to obtain an aggregate discounted present value of the project in the future years (Layard, R., 2012, p.4).

Many appreciations and several critics as well have been brought to the CBA using in projects (Revesz, R.L. & Livermore, M.A., 2011). According to the authors, some of the CBA positive aspects are considered to be: social factors and pollution as factors of risk, rationality required in

spending money, the decision-making transparency, the accountability of decision-makers, the allowing the pricing mechanism to aggregate information and the allocation of the scarce resources, confronting with imperfect information in order to facilitate the formal outputs and others. Among the critics the main statements refer to: the immoral commodification, the CBA is not a scientific one even if it works with risks and uncertainty, it makes unfair distribution of regulatory benefits and it may produce regulatory pariah.

2. CBA investment project management difficulties

As the authors mentioned above have stated, the CBA decision is made by comparing the investment costs present value with the benefits present value. The project is analyzed according to specific guides, depending on the financier or national regulations (for example, the EU guide, 2008).

In conducting an investment project the managers are often facing some difficulties that might occur. The difficulties encountered may conduct to the project failure or the worth determining the decision-maker to give up the investment. The most frequent difficulties identified are the followings:

- *Investment project financing*

The investment project might be financed by the organization's internal or external or by a combination between internal or external funds. The CBA is emphasizing which amount of the three mentioned sources of financing could be relied on in the main.

- *Forecasting the benefits and expenses for the cash flow*

The main problem is to set the assumptions and to forecast the benefits' increasing or decreasing over time on one hand and how detailed to forecast the expenses on the other hand. That depends on the capacity the investments is designed and used and on the market and the prices demands. Concerning the expenses, some project managers are using percentages out of the benefits. The best way is to analyze each group of costs in correlation with the investment capacity and the degree of usage. The wages are the first expense considered and these depend on the number of new jobs creation and the level of each salary. "In labor market studies of the value of life, differences in wages among jobs may depend on variations in status among jobs and the bargaining power of different unions" (Boardman, A.E. et al, 2012, p.348). Then, the utilities, materials, externalized services and taxes have to be correlated with the activity volume.

- *Discounted rates choosing*

The costs and benefits are changing their value in time so that they are discounted to a discount rate in order to show their present value. The discount rate depends on the industry or national sector the investment is going to be used. In public sectors or the projects financed by the EU structural funds is generally used a discount rate of 5-6% (EU, 2008).

- *Externalities identification*

The externalities refer to the positive and negative factors attached to the investment which have positive or negative impact on the organization external stakeholders. "In the absence of externalities the net social benefit of a project will be greater than the private profitability. Thus if a project is profitable necessarily it will be also socially worthwhile" (Watkins, T., 2014), because the author is claiming that the Net Social Benefit equals to Social Benefit for Direct Effects plus Net Effect of Externalities.

The social impact includes the investment project impact on people, which is intangible assets or liabilities, difficult to be expressed in money terms. The project manager's judgment and rationality are very important to discover hidden and indirect implications.

The environment factors are also included in projects appraisal (Revesz, R.L. & Livermore, M.A. 2011, p. 12-14). Among the environmental factors, the pollution is more often considered in the investment projects.

- *Sensitivity scenarios*

The scenarios for the sensitivity analysis are often drawn having in view the fewest variables possible to ease the analysis or sometimes too many for a better accuracy with the reality; a compromise between these extremes is the best way of approaching the necessities. However, "optional analyses could be done on the other long-term scenarios. If these scenarios are not fully analyzed, their effect on the different projects should be qualitatively considered. The other scenarios used for sensitivity analysis can be top-down scenarios or bottom-up" (EC, 2013, p.11).

3. The pattern for BCA procedure in investment projects

Most of the above mentioned difficulties might be avoided whether the project managers are using the pattern proposed below. The pattern has its roots in different guides and in practice and it systematizes the way to be followed, being based on rationality.

The procedure comprises two stages: the first stage is dedicated to the investment financial CBA (Figure no. 1) and the second one to the economic CBA of the project (Figure no. 2). The figures emphasize the steps to be followed with the procedure, the main questions for every step and the general sources of information and data (organization's internal or external sources).

Stage 1: Financial analysis

Step 1: Investments project objective

The project manager has to answer the following questions: What needs the project would cover? What resources it has at disposal? What markets niche the products or services would serve? What horizon of time could be projected? All these questions will find answers searching for internal and external information and data.

Step 2: Project financing

The questions to be answered are: Who is the project sponsor? Who is or are the project financier or financiers? What amount of money could be count on for the project? The answers could be found by using internal and external information.

Step 3: Conditions setting

The questions to be answered are: What conditions the project might accomplish? What level of conditions? What options the project manager may choose? The answers could be found by using internal and external information.

Step 4: Benefits forecasting

The project manager has to answer the following questions: What products or services the organization wishes to offer on the market? At what amount according to the investment's capacity and the market demand? Who would be the products or services beneficiaries or the clients? What prices would be used on the market? The answers will be found by searching for internal and external information.

Step 5: Costs forecasting

The questions to be answered are: How many employees would work with the investment's object? What kind of employees? What wages per year would be spent for the employees? What utilities would be necessary? What volume would be energy, gas, water and garbage collection necessary and with what price? What other issues, like materials and external services would be necessary to exploit the investment's object? What quantity and at what price? What taxes would be paid and at what amount? How much would all expenses increase/decrease yearly? The answers will be found by searching for internal and external information.

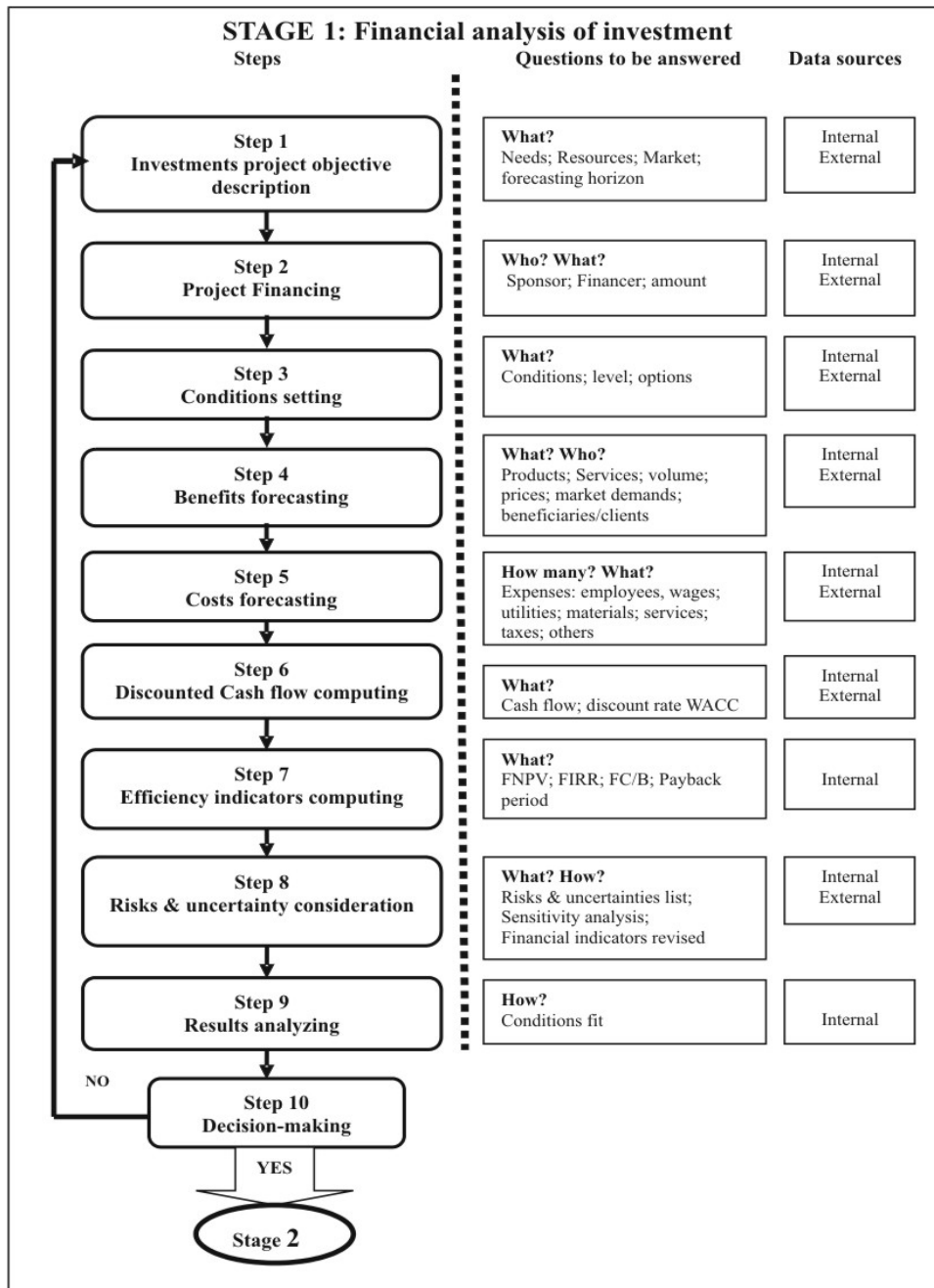


Figure no. 1. CBA procedure stage 1: financial analysis of investment

Step 6: Discounted cash flow calculation

Having the project benefits and costs forecasted, the next step implies the cash flow and the discounted numbers calculation. The question to be answered is what level of the discount rate would be used for calculation? The answer will be also found by searching for internal and external information and the WACC (weighted average cost of capital) would be calculated to determine the discount rate.

Step 7: Efficiency indicators calculation

The question to be put is: What indicators to be calculated? The main efficiency indicators used in investment projects are: FNPV (financial net present value), FIRR (financial internal rate of return), payback period and the FC/B or FB/C ratio (financial cost/benefit or financial benefit/cost). All data could be found internally.

Step 8: Risks and uncertainties; sensitivity analysis

The risks and uncertainties are to be considered. The questions to be answered are: what kind of risks or uncertainties could appear to change (increase or decrease) the forecasted efficiency indicators? A list of risks and uncertainties has to be done firstly and then the sensitivity analyses have to be applied by changing the inputs values according to the identified risks and uncertainties. The outputs would highlight the new efficiency indicators levels, whether Excel soft is used. The necessary information and data could be found from internal and external sources.

Step 9: Results analysis

The options chosen at the beginning and the way the project is fitting the established conditions would be analyzed, answering the questions: Does the project fit the conditions? What option would better fit them? The answers are based on the internal collected information and computed data.

Step 10: Decision-making

Considering the results obtained in the below steps the question to be put is: What the project manager would decide for? Once the decision has been made the project manager would pass to the second stage or start from the beginning the entire analysis.

Second stage: Economic analysis

Step 11: Conditions setting

Considering the external factors impact on the project the project manager would answer the questions: What conditions and at what level the project

would accomplish? Information and data would be found internally and externally.

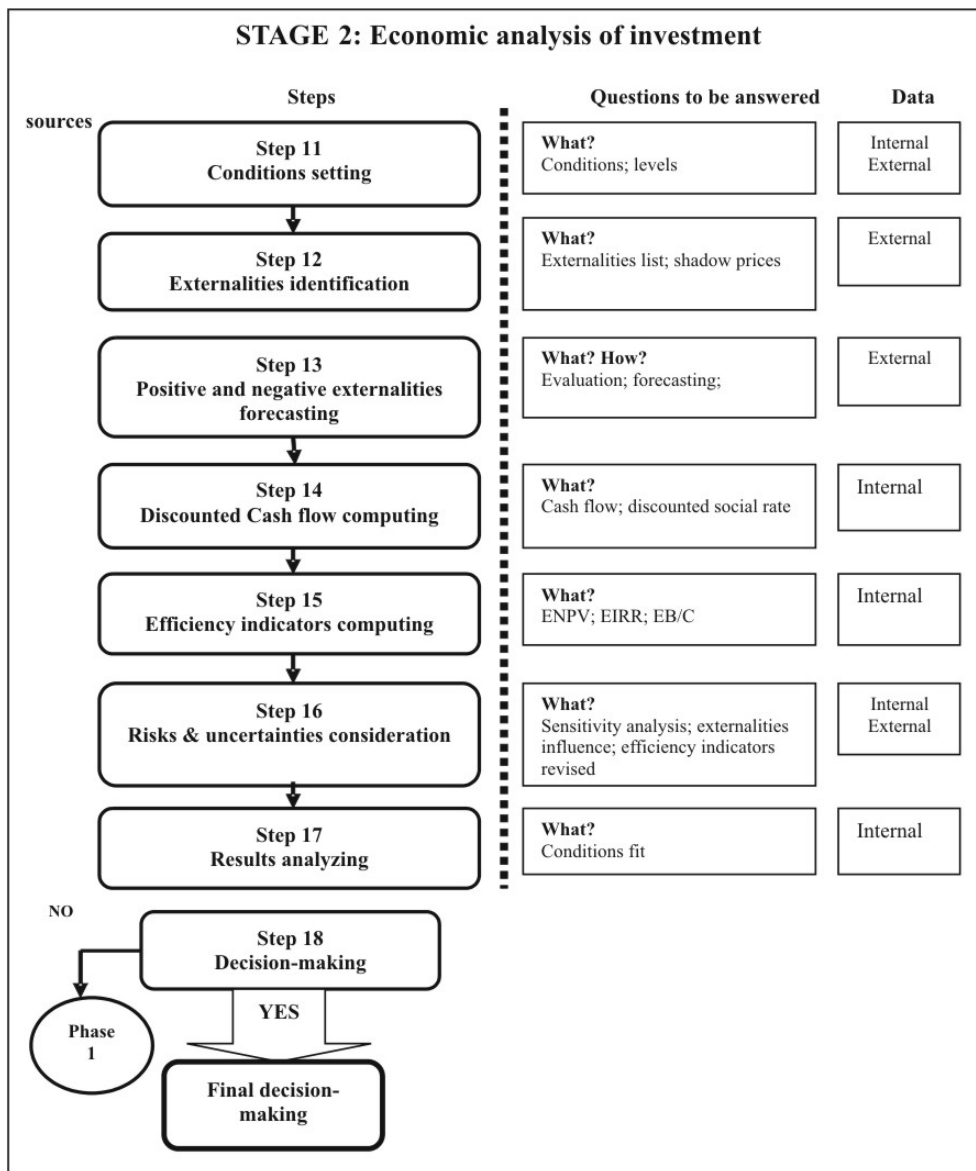


Figure no. 2. CBA procedure Stage 2: investment economic analysis

Step 12: Externalities identification

The questions to be answered are: What externalities would influence the investment project efficiency? What shadow prices (hidden, indirect) would be considered? The answers could be found externally. A list of possible external factors (social and environmental) that could have impact on the project has to be written down.

Step 13: Positive and negative externalities forecasting

The question to be answered is: How would positive and negative externalities influence the project in the chosen horizon of time? At what amount each external factor has to be considered? How indirect project factors could be transformed in money values? The answers would be found in external sources.

Step 14: Economic discounted cash flow computing

Extracting from the positive forecasted entrances the negative forecasted entrances the economic forecasted cash flow would be obtained. The figures have to be discounted, but the question is: What social discounted rate would be used in computing? The answer could be found in external sources. Usually, the social discount rate is higher than the financial discount rate.

Step 15: Efficiency indicators computing

The question to be put is: What economic efficiency indicators would be calculated? The main indicators that highlight the project efficiency are: ENPV (economic net present value), EIRR (economic internal rate of return) and the ratio EB/C or EC/B (economic benefits/costs or economic costs/benefits).

Step 16: Risks and uncertainties; sensitivity analysis

Several risks and uncertainties always have significant influence on the externalities. The question to be answered is: What externalities could be changed in the future and how? The sensitivity analysis would permit to change the inputs (increase or decrease) to see how the economic efficiency indicators are changing. The economic indicators would be revised accordingly.

Step 17: Economic results analysis

The economic results obtained would be analyzed according to the conditions set at the beginning of the procedure to see whether or not they fit the project's management and investment financier's expectations.

Step 18: Final decision making

Whether the results obtained are satisfying or not, the final decision is made: the investment project is accepted or the procedure is starting from the beginning.

4. Conclusions

The BCA has the reason to emphasize whether an investment project is efficient or not. Different guides, according to EU or national principles and regulations and the specific literature, are available for investment project managers, as well.

The originality of this paper comes from the practical approach of the cost-benefit analysis following the pattern proposed, i.e. the way the problems are to be understood and systemized and the gradual and clear approach of the procedure.

The pattern of the CBA procedure proposed in this paper could be later improved or developed by the author or other theorists and practitioners.

References

- Boardman, A.E., Greenberg, D.H., Vining, A.R. (2012) *Cost-benefit analysis, Concepts and practice*, 4th ed., Pearson Prentice Hall, New Jersey.
- Bosch-Sijtsema, P.M., Henriksson, L-H. (2014) Managing projects with distributed and embedded knowledge through interactions, *International Journal of Project Management*, Available online, retrieved March, 25, 2014, <http://www.sciencedirect.com/science/article>.
- Dreze, J., Stern, N. (1987) The Theory of cost-benefit analysis, in *Handbook of Public Economics*, vol. II, edited by A.J. Auerbach and M. Feldstein, © 1987, Elsevier Science Publishers B. V. (North-Holland), chapter 14.
- Egginton, B. (2012) Realizing the benefits of investment in project management training: Evidence supporting the need for a more strategic approach, *International Journal of Managing Projects in Business*, Vol. 5 Issue 3, pp.508 – 527.
- European Union (2008) *Guide to Cost-benefit analysis of investment projects. Structural Funds, Cohesion Fund and Instrument for Pre-Accession*, ec.europa.eu/regional_policy/sources/docgener/.../cost/guide2008_en.pdf.
- European Commission (2013): *ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects*, Draft 12 June 2013, Brussels.
- Heinzerling, L., Ackerman, F. (2002) *Pricing the priceless: Cost-Benefit Analysis of Environmental Protection*, Georgetown University publication.

- Layard, R., Glaister, S. (2012) *Cost-benefit analysis*, Cambridge University Press.
- Lester, A. (2007) *Project Management, Planning and Control*, Elsevier Ltd., pp. 65-72.
- Mishan, E.J., Quah, E. (2007) *Cost-benefit analysis*, 5th ed., Routledge, New York.
- Phillips, J., Phillips, P., Stone, R. and Burkett, H. (2007) *The ROI Field Book: Strategies for Implementing ROI in HR and Training*, Butterworth-Heinemann/Elsevier, Massachusetts.
- Revesz, R.L., Livermore, M.A. (2011) *Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health*, Oxford University Press, USA, reprinted, Book presentation.
- Roy, A., (1984) *Cost-Benefit Analysis: Theory and Application*, Johns Hopkins University Press.
- UK Guide (2014): *Strategy Survival Guide in the UK Prime Minister's Strategy Unit*, 2004, retrieved March, 23, 2014, <http://betterevaluation.org/evaluation-options/CostBenefitAnalysis>.
- Watkins, T. (2014) *An introduction to cost benefit analysis*, retrieved March, 28 2014, www.sjsu.edu/faculty/watkins/cba.htm.