

## RESUMPTIVE EVALUATION OF INVESTMENT PROJECT EFFICIENCY

### Leonas Simanauskas

Prof. Dr. Habil.  
Faculty of Economics, Vilnius University  
Saulėtekio al. 9 II, LT-10223, Vilnius, Lithuania  
Phone: + 370 8 5 236 62 92  
E-mail: leonas.simanauskas@ef.vu.lt

### Skirmantas Šidlauskas

Finance Engineering Department,  
Vilnius Gediminas Technical University  
Saulėtekio al. 11, LT-10223 Vilnius, Lithuania  
Phone: + 370 8 5 210 73 47  
E-mail: skimantas@bavi.lt

The article deals with the problems of evaluating the efficiency of investment projects, attention being on the evaluation of investment projects financed from EU structural funds, illustrating that it is very complicated to evaluate projects by using separate efficiency criteria and that to find the generalizing indicator, criteria of different aspects are required. The evaluation of investment projects should be based on economic, social and environmental criteria selected and grouped taking into account the objectives of EU support assignment. As an example, the applicability of the proposed method in analysing EU financed projects is shown, and it is proven that this method provides a correct and objective picture (efficiency) of the projects.

*Keywords:* investment, investment project, multi-criteria evaluation.

### 1. Introduction

Today the system of values of business subjects is being transformed into general objectives of an enterprise (economic, financial, social, environmental and others) which are mainly implemented with the help of investment projects. Therefore, the efficiency of investment projects is evaluated by using economic, financial, technological, ecological-environmental and other efficiency indicators. However, in practice sometimes it is difficult to make investment decisions as often, according to some of these indicators, an investment project can be very beneficial and efficient, while according to other factors it can even be inappropriate to implement. It is also common that one efficiency indicator is picked out of the context and decisions are based on it.

The evaluation process is also hampered by the fact that it is necessary to take into account the importance of individual indicators (i.e. indicators are not of equal importance) in order to achieve the investment targets. There is no one specific generalized indicator to cover all aspects of investment project analysis and to show the general (integrated) efficiency of a project, as the impact of different factors on a project is of diverse origin and they are targeted to evaluate different investment objectives.

The process of evaluating the efficiency of investment projects is a complicated problem both for theoreticians and practitioners. It is of utmost importance while evaluating investment projects financed from EU funds. The competitiveness of the Lithuanian economy and its de-

velopment in the near future depend on the effective evaluation of such projects.

Objective data on the efficiency of alternative investment projects can be obtained when they are evaluated using more than one aspect and several indicators instead of one dominant indicator (multi-criteria method). The practical relevance of the problem urged the authors to undertake research in this field. The article deals with the evaluation of the efficiency of alternative investment projects implemented in the business sector by using the principles of the multi-criteria evaluation method.

This publication offers a new approach to be evaluation of investment projects financed by EU structural funds. *The aim* of the research was to analyze the multi-criteria evaluation of investment project efficiency and give suggestions on the application of this method for evaluating investment projects financed from EU structural funds. The research *object* is the multi-criteria evaluation method of the efficiency of investment projects. The *research methods* based of many-year practical experience of the authors in the field of evaluating the efficiency of investment projects and in applying multi-criteria evaluation methods.

## 2. Evaluation of Investment Efficiency

The drawbacks of the indicators used for the evaluation of investment project efficiency and the absence of one generalizing efficiency indicator necessitate searching for more efficient methods of evaluating investment, and especially those projects financed from the state budget or other funds (e. g., investment projects financed from the Lithuanian budget and EU structural funds). The solution of complicated social-economic and organizational-managerial tasks

is a multi-criteria dimension: selection of the best project decisions from the potential ones (alternative decisions) is evaluated not by one separate indicator but by several independent and unrelated indicators. In this connection, it is important to have project evaluation methods encompassing the advantages of the above-mentioned methods and mathematical algorithms and providing correct results that do not contradict each other. To solve this problem, the project efficiency can be evaluated when the efficiency is analysed in order to compare and evaluate the internal and external factors of a project.

In a real economy sector, the tasks of investment implementation and investment efficiency evaluation are commonly solved as unicriterial ones, i. e. are based on when there is a single indicator of investment efficiency, which is regulated by different legal acts, recommendations and methodologies (e. g., in evaluating investment projects financed from EU funds, only one investment efficiency indicator, IRR, is evaluated and the projects selected for implementation do not necessarily have the highest IRR value but at least correspond to the minimal indicator value fixed) [13]. In such processes, one main investment efficiency indicator (e. g., internal rate of return) or several separate efficiency indicators are analysed. While using one efficiency indicator it is taken that decision makers are only interested in one of investment strategy characteristics (e. g., the rate of return, payback period, etc.). However, these methods can be used only when an indicator taken as the main one is absolutely dominant and the probability of its calculation error is very limited. However, today such an indicator that would be commonly accepted as a universal one is non-existent [17–20]. Therefore, the use of one efficiency indicator does not provide an opportunity to evaluate the

experience of different projects (it is impossible to evaluate the attainability of all planned objectives), as it is used in a simplified system, is one-sided and far-off from the real essence of investment optimization.

The authors of the article, in collaboration with the Baltic Agrobusiness Institute, have analysed ten business investment projects ( $A_1, A_2, \dots, A_{10}$ ) which are planned to be implemented in the agricultural sector (the investments of all the projects are planned to be implemented in primary agricultural production). These investment projects are prepared with a view to obtaining EU financial support for their implementation and at the moment are submitted for evaluation. Separate efficiency indicators of each of these projects have been analysed (two indicators change in one direction – these are the maximizing indicators; and the third one is a minimizing indicator). These indicators are commonly relevant to project evaluating institutions (banks, institutions administering EU support, etc.). The financial indicator (IRR), the social indicator (creation

of new working places) and the environmental indicator (a share of energy costs in the total costs) have been analysed, and now we shall analyse the efficiency of different projects according to these indicators.

The distribution of the projects by the IRR indicator is shown in Fig. 1.

Figure 1 shows that projects  $A_2$  and  $A_8$  have the highest IRR values (this fact indicates that these projects are the most profitable and “safest” of all the other projects analysed) and the IRR values of projects  $A_1$  and  $A_7$  are the lowest (i. e. these projects are hardly viable economically under current economic conditions).

The distribution of the investment projects by the values of the social indicator (creation of new work-places) is illustrated in Fig. 2.

Figure 2 illustrates that the largest number of work-places would be created if projects  $A_7, A_9$  and  $A_{10}$  could be implemented (the implementation of these projects would allow reduction of social inequality in certain problem territories). The least influence on social welfare would be exerted by projects  $A_4$  and  $A_8$ .

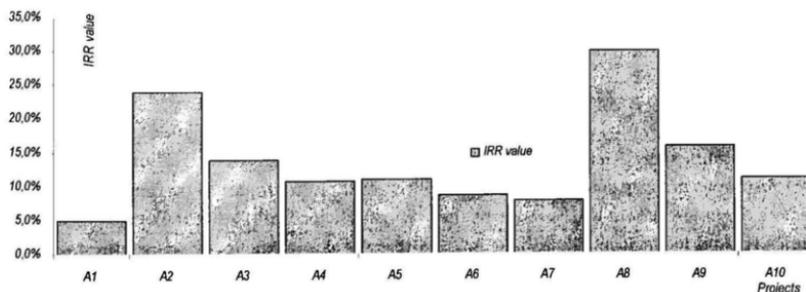


Fig. 1. IRR values of investment projects

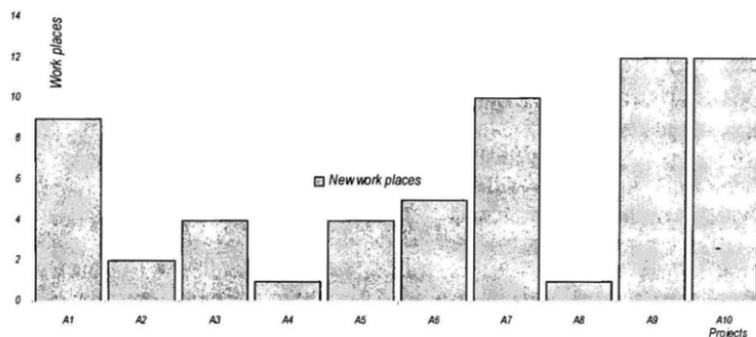


Fig. 2. Comparison of the investment projects by new work-places

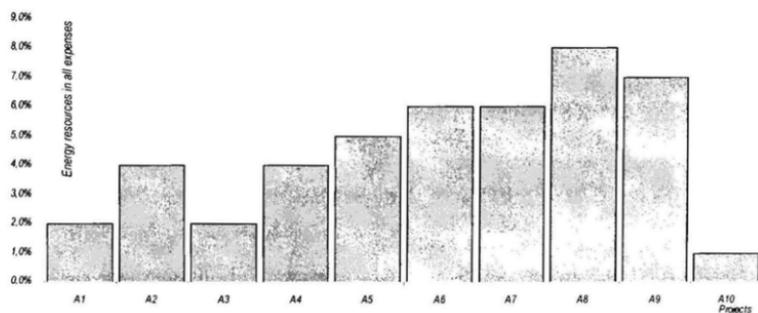


Fig. 3. Comparison of the investment projects according the use of energy resources

The distribution of investment projects by the values of the environmental-ecological indicator is shown in Fig. 3. We can see that the minimal energy resources are required by projects  $A_3$  and  $A_{10}$  (at the same time they are the most environmentally friendly). The greatest energy resources are required and the biggest impact on the environment will be made by the activities related to projects  $A_6$ ,  $A_8$  and  $A_9$ . It should be noted that all these projects are implemented in similar business sectors, therefore, the technologies used are similar as well.

A comparison of separate efficiency indicators of the mentioned ten investment projects has proved that certain indicators are better in one kind of projects and the other indicators are better in other projects (Table 1). With reference to this single analysis it is difficult to select the most suitable project to be financed (i. e. the most efficient one) and to select projects to be rejected as inadequate. Analysis of these projects shows that uni-criterion methods cannot provide a comprehensive and consistent situation regarding the efficiency of the alternative projects. For examples institutions admi-

nistering support to agriculture use only one IRR indicator as the dominant for investment efficiency and would advise to implement nine investment projects of the ten analysed, because they correspond to the established minimum IRR value (project A<sub>1</sub> does not meet this critical value) without taking into account the other factors.

While taking into account the above mentioned disadvantages of the uni-criterion approach and evaluating investment efficiency, it is recommended to use multi-criteria methods. Comparing investment strategies according to several efficiency indicators, special methods allowing to combine these indicators into one can be used [1, 2]. Such methods can be the sum or product of separate indicators (generalizing indicator is a sum of a combination of partial indicators). However, in general, selection of such an efficiency indicator is one of the most important and complicated stages, which

requires experience, knowledge of the subject and elements of creative approach from the assessor [11, 12].

Recently multi-criteria evaluations are analysed and applied more intensely and in more varied fields. Multi-criteria evaluation methods of investment efficiency can be divided into two groups: 1. simple methods (geometric mean, product sum of values and weights of indicators SAW (*Simple Additive Weighting*) and *sum of units*); 2. complicated methods (TOPSIS, ELECTRA, PROMETHEE, VIKOR, complex proportional, simplified complex and other methods) [6, 7, 10]. While analysing the problems mentioned in this paper and with a view to achieve the objective of the research, it is enough to use only multi-criteria evaluation methods of the first group (SAW, geometric mean).

Multi-criteria evaluation of an investment project efficiency is carried out in the sequence shown in Fig. 4 (main stages of evaluation).

Table 1. Efficiency indicators of the investment projects and project priority by separate indicators

Project	IRR		New work-places		Use of energy resources	
	Value	Priority	Value	Priority	Value	Priority
A <sub>1</sub>	5.0%	10	9	4	2.0%	2-3
A <sub>2</sub>	24.0%	2	2	8	4.0%	4-5
A <sub>3</sub>	13.9%	4	4	6-7	2.0%	2-3
A <sub>4</sub>	10.7%	7	1	9	4.0%	4-5
A <sub>5</sub>	11.0%	6	4	6-7	5.0%	6
A <sub>6</sub>	8.7%	8	5	5	6.0%	7-8
A <sub>7</sub>	7.9%	9	10	3	6.0%	7-8
A <sub>8</sub>	30.0%	1	1	9	8.0%	10
A <sub>9</sub>	15.8%	3	12	1-2	7.0%	9
A <sub>10</sub>	11.2%	5	12	1-2	1.0%	1

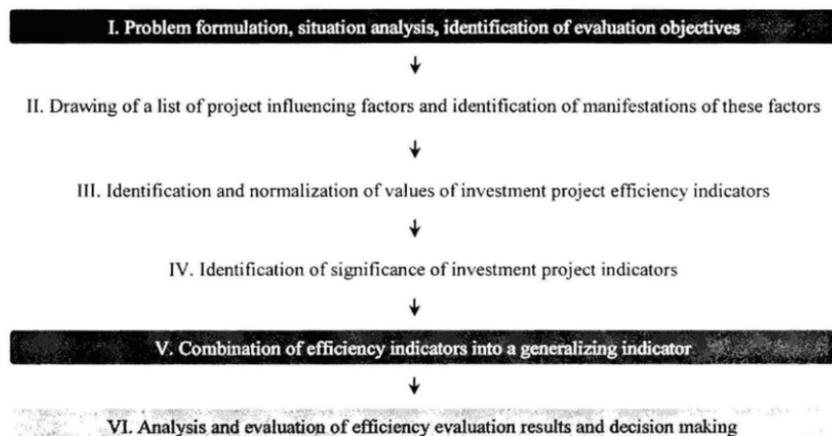


Fig. 4. Stages of multi-criteria evaluation of investment projects

In stage I, the problem (problems) and the research object are identified and formulated, investment environment factors (external and internal, risk factors) influencing the project are analysed and evaluation objectives are established. The following methods of information analysis are used: SWOT analysis, analysis of critical success factors, comparison, etc. [8, 9].

In stage II, a list of the factors influencing the investment project is drawn and the system of project influencing factors is formed. An investment project is a complicated phenomenon, and it is not possible to describe it by one value or indicator as it is difficult to find a feature that would encompass all aspects of A phenomenon. The factors included in the evaluation of an investment project are combined into certain groups (economic, financial, social, environmental-ecological, technological, etc.).

In order to describe and evaluate the efficiency of a project more comprehensively and correctly, it is important to evaluate as many

factors as possible, because when a small number of factors is analysed (or only one kind of factors, e. g., financial), there is a risk that important aspects of the investment project influencing its overall efficiency of the project will be left out of assessment. However, the great number of factors has its negative side: when analysing numerous factors they are difficult to formalize and it is complicated to evaluate their weight (significance), as well as it requires huge time and financial resources.

In this stage, quantitative expressions of the factors (indicators) influencing alternative investment the projects are also identified. The selection of indicators should be performed taking into account project evaluation objectives, the project scope, the level of assessors' competence, reliability of available information and other criteria [3, 17]. Each of these indicators bears its realitive information: a discounted cash flow provides information on the project risk and liquidity, NPV shows the economic effect

on project participants, IRR evaluates the profitability of investments and provides information on the project "safety", etc. [4, 14, 15, 22, 23] The following selection principles are recommended for the selection of indicators: a) indicators should be simple and definite in their composition and mathematical algorithm; b) indicators should be widely used in practice and familiar to different project participants; c) it is necessary to evaluate the reliability and completeness of the information used to calculate an indicator; and d) it is necessary to determine the minimum and maximum number of a set of evaluation indicators [17]. In case of a great number of indicators it is recommended to rate them.

In stage III, the values of the selected efficiency indicators are identified and normalized.

In stage IV, a model for identifying the significance of the efficiency indicators of an investment project is selected and the significance of indicators (weight) is established. In the evaluation presented in this paper the significance (weight) coefficients were applied. They were prioritized and normalized in the scale from 0 to 1 and changing in one direction (positive > 0).

In stage V, a method of combining the efficiency indicators into a generalizing value is selected (e. g., a sum or product of separate indicators when the generalizing indicator is a sum or combination of partial indicators), and the project efficiency indicators are combined into one generalizing value. When several indicators are evaluated in the efficiency analysis, they can be combined into one generalizing value or objective trees can be designed, i.e. special methods that allow combining them into one can be used. Such selection of an investment efficiency indicator is one of the most important and complicated stages of solution; it requires

experience, knowledge of the subject and a creative approach of the researcher.

In stage VI, the results achieved during the evaluation of the investment projects are analysed, and with help of this analysis the decisions regarding implementation of separate (alternative) projects are taken.

When solving the problems of evaluating investment project efficiency, the application of this model has several major limitations. First of all, this method is mostly suitable to evaluate business projects, because the economical-social criteria which have mathematical expression are chosen. A more complicated situation occurs when non-business (public) projects are evaluated, because the evaluation criteria of such projects often have no specific mathematical quantitative expression (in practice, often criteria having predetermined values are selected, e. g. *yes* or *no*, etc.). In such a way the uncertainty of the criteria, the risk that the project criteria will be misinterpreted, increases and the evaluation error will be gross. Therefore, in evaluating non-business projects it is necessary to adapt this method to a specific situation. Another limitation is the fact that this model is based on a rather sophisticated mathematical basis and requires a huge amount of information material. Therefore, in evaluating micro-projects the application of this method is complicated and is highly time-consuming. Evaluation of the projects financed by EU support funds involves one more problem – the lack of qualified experts able to apply this method in practice efficiently and correctly.

Let us analyse the functioning reality of the proposed method for project efficiency evaluation and a possibility to apply it in a real economic sector. First of all the most important groups of factors determining the efficiency of

an investment project are identified, taking into account the targets of investment implementation. Then the factors having the biggest impact on the project efficiency are selected from the identified factor groups. The quantitative and/or qualitative indicators or these factors are determined. The indicators are selected taking into account the investment targets and are divided into several main groups: economic-financial criteria (IRR, NPV, PP, etc.), social indicators (number of new work-places, degree of reducing social unevenness, etc.), environmental – ecologic indicators (level of pollution emissions, of raw materials consumed, etc.), technological-innovative indicators (indicator of resource economy, etc.) and other.

At the next stage, the indicators of individual factors of investment projects are determined.

The evaluation of the indicators of the economic factor group is presented in Table 3 (indicators of other factor groups are calculated analogously). The achieved indicators of particular projects are compared with these indicator values.

An comparing the investment project indicators with their standard values, corrected indicator values are calculated (correction of indicators of the economic factor group is presented in Table 4. Indicators of other factor groups are calculated analogously). The calculated values are given marks and the indicator values of each alternative project are added.

The calculated indicator values are corrected taking into account their significance (weight). On evaluating the significance coefficients, the values of these indicators are found (Table 5).

Table 2. Factors determining investment project efficiency and their manifestations (indicators)

Factor group	Factors (q)	Indicators
Economic	Added value created Return of investments Profitability of investments, etc. (their number $E$ )	$F_j^e$
Social	Creation of new work-places Improvement of social climate Improvement of working conditions, etc. (their number $S$ )	$F_j^s$
Environmental-ecologic	Reduction of pollution Reduction of energy resource consumption, use of alternative energy resources, etc. (their number $A$ )	$F_j^a$
Technological	Introduction of innovations, increase of productivity, saving of resources, etc. (their number $T$ )	$F_j^t$

here  $k = \{e; s; a; t\}$ ;  $e = 1, 2, \dots, E$ ;  $s = 1, 2, \dots, S$ ;  $a = 1, 2, \dots, A$ ;  $t = 1, 2, \dots, T$ .

Table 3. Comparison of investment projects by evaluation indicators

Alternative projects	Factor group $k^e$
	$V_j$
$A_i$	$R_{ij}^e$
Standard value of indicators	$R_{ij}^{e*}$

here  $A_i$  – investment project  $i$ ;  $k^e$  – economic indicators,  $V_j$  – indicator of economic factor group  $j$ ,  $R_{ij}^e$  – value of indicator  $j$ ;  $R_{ij}^{e*}$  – standard value of indicator  $j$ .

Table 4. Correction of indicators using marks

Alternative projects	Indicator values of factor group $k^e$ (in marks)	Sum of indicator values
	$V_j$	
$A_i$	$F_{ij}^e$	$F_i^e = \sum_j F_{ij}^e$
Weight coefficient $w$	$w_j$	

here  $F_{ij}^e$  – value of corrected indicator  $j$  in marks;  $F_i^e$  – sum of mark values of economic indicators of investment project  $i$ ;  $w_j$  – weight coefficient.

Table 5. Evaluation of the efficiency of investment projects

Alternative projects	Indicator values of project influencing factor groups after evaluation of weight coefficient				Project efficiency
	$k^e$	$k^s$	$k^a$	$k^t$	
$A_i$	$H_{ij} = w_j * F_{ij}^e$				$H_i = \sum_j H_{ij}$

Then, the values of factor group indicators of particular projects are added (combined into a generalizing indicator).

All alternative investment projects are rated according to the highest generalizing indicator. Investment projects can be rated upon determining a certain minimum efficiency limit, without which the investment projects are automatically rejected or communicated for correction.

here  $H_{ij}$  – value of indicators of factor group  $i$  after the weight coefficient evaluation; – sum of indicator values of project  $i$  economic factors  $i$ ;  $H_i$  – efficiency of project  $i$ .

### 3. Results of multi-criteria evaluation of investment project efficiency

To prove the applicability of the presented multi-criteria method of efficiency evaluation in evaluating real business projects, ten investment business projects have been analysed. The objective of this research is to appreciate, whether the method is appropriate to evaluate and rate alternative investment projects. The authors of the paper, with the help of the Baltic Agrobusiness Institute, have analysed investment projects prepared in 2005 with a view to obtaining EU financial support. All these investment projects are related with business, they are implemented by private companies operating under similar circumstances in the market and having similar resources. The target of investment implementation is modernization of the existent production basis in order to comply with all relevant EU requirements applied to their operation. The investments amount to 3 million litas. The indicators of efficiency evaluation of these projects, taking into account the investment objectives, are divided into three groups (economic, social and environmental). The practical example analyses the same indicators that are

discussed in the beginning of the paper (IRR, creation of new work-places and the share of energy resource costs in the total costs). The initial data on the investment projects are presented in Table 6.

The indicator values corrected according to the standard values are presented in Table 7 (in marks). In the next stage, the weight of each of the indicators is evaluated (the weight coefficient is normalized in the scale from 0 to 1 and is positive).

The values of the efficiency indicators after evaluating the significance (weight) coefficients are presented in Table 8. The total sum of the indicator values of each alternative project is evaluated. The priorities of the investment projects are fixed according to the maximum number of marks (Table 8). The projects are also rated by the number of marks: if a project gets less than 50 marks, it is returned for re-evaluation, and if a project gets more than 50 marks, its further implementation is discussed.

The reliability and substantiation of the project efficiency evaluation method analysed in the paper have, been achieved on the ground of the basic methods of economic analysis, evaluation theory and the works of Lithuanian and foreign researchers and practitioners. The method can be applied for evaluating the efficiency (not only financial but also social, technological, environmental, etc.) of different investment projects, taking into account the determined evaluation targets. This method allows also an efficient rating of project indicators and achieving the total result of all indicators. This method (due to its versatility, depth of analysis and the single result of integral efficiency) could be adapted in a broad sense while evaluating projects supported by EU structural funds or innovation projects (adapting the calculation base for a particular case) as it is dynamic and can be applied for

Table 6. Indicator values of alternative investment projects

Alternative projects	Indicators of factor groups influencing an investment project		
	IRR ( $V_E$ )	Creation of new work-places ( $V_S$ )	Share of energy resource costs in total costs ( $V_A$ )
A <sub>1</sub>	5.0%	9	2.0%
A <sub>2</sub>	24.0%	2	4.0%
A <sub>3</sub>	13.9%	4	2.0%
A <sub>4</sub>	10.7%	1	4.0%
A <sub>5</sub>	11.0%	4	5.0%
A <sub>6</sub>	8.7%	5	6.0%
A <sub>7</sub>	7.9%	10	6.0%
A <sub>8</sub>	30.0%	1	8.0%
A <sub>9</sub>	15.8%	12	7.0%
A <sub>10</sub>	11.2%	12	1.0%
Value of standard indicators ( $F^*$ )	IRR < 6.5% – 0 marks 6.5% ≤ IRR ≤ 10% – 10 marks 10% < IRR ≤ 15% – 20 marks IRR ≥ 15% – 40 marks	Up to 2 work-places – 5 marks From 2 to 5 w. – places – 10 marks From 5 to 10 w. – places – 20 marks More than 10 w. – places – 30 marks	Up to 2% – 30 marks; From 2 to 4% – 20 marks; From 4 to 6% – 10 marks More than 6% – 0 marks

Table 7. Corrected indicator values of alternative investment projects

Alternative projects	Indicators of factor groups influencing an investment project (in marks)		
	$F^c$	$F^s$	$F^a$
A <sub>1</sub>	0	20	30
A <sub>2</sub>	40	5	20
A <sub>3</sub>	20	10	30
A <sub>4</sub>	20	5	20
A <sub>5</sub>	20	10	10
A <sub>6</sub>	10	10	10
A <sub>7</sub>	10	20	10
A <sub>8</sub>	40	5	0
A <sub>9</sub>	20	30	0
A <sub>10</sub>	20	30	30
Coefficients of significance (weight) (w)	0.9000	0.9500	1.0000

Table 8. Indicator values of alternative investment projects

Alternative projects	Indicator values of factor groups influencing an investment project after weight coefficient evaluation			Project efficiency (H)	Project priority	Project status
	H <sub>E</sub>	H <sub>S</sub>	H <sub>A</sub>			
A <sub>1</sub>	0	19	30	49	4	Rejected
A <sub>2</sub>	36	5	20	61	2	Approved
A <sub>3</sub>	18	10	30	58	3	Approved
A <sub>4</sub>	18	5	20	43	6	Rejected
A <sub>5</sub>	18	10	10	38	9	Rejected
A <sub>6</sub>	9	10	10	29	10	Rejected
A <sub>7</sub>	9	19	10	38	8	Rejected
A <sub>8</sub>	36	5	0	41	7	Rejected
A <sub>9</sub>	18	29	0	47	5	Rejected
A <sub>10</sub>	18	29	30	77	1	Approved

different evaluation purposes. Today the methods of investment project efficiency evaluation are rather important, taking into account that in market economy it is necessary to have a wide choice of analysis instruments for investment activities, and one of such instruments could be the method proposed by the authors.

#### 4. Conclusions

1. When evaluating investment projects by separate criteria, it is very difficult to compare the projects and rate them. Therefore, different criteria (economic, financial, social, environmental, etc.) are required, and they should be combined into one generalized value.

2. In evaluating investment projects, it is possible to distinguish efficiency criteria groups selected according to the objectives of EU structural support assignment. In evaluating ten investment projects, the authors have distinguished three groups of criteria which are relevant in al-

locating EU support for the agribusiness sector projects. These groups are the financial, social and environmental criteria.

3. The proposed multi-criteria method of investment project evaluation involves the following actions: identification of project evaluation targets, evaluation of factors influencing an investment project, selection of evaluation indicators for project efficiency, combining efficiency indicators into a generalizing value, evaluation of multi-criteria project efficiency, and the analysis and evaluation of the efficiency results. The authors show how the method of investment project evaluation can be applied in practice by using information technologies.

4. To prove the substantiality of the proposed evaluation method of investment project efficiency, ten investment projects claiming to get EU financial support have been evaluated. The evaluation criteria were selected taking into account the objectives of EU support assignment,

compared with standard values, and the generalizing indicator was identified. The analysis has shown that three investment projects are suitable for being financed and put into practice, and

the remaining ones should be rejected or corrected. The proposed method is suitable for the analysis of the above described processes and gives a correct and objective picture of the projects.

## REFERENCES

- Belli, P., Anderson, J., Barnum, H., Dixon, J., Tan, J. P. (1997). *Handbook on Economic Analysis of Investment Operations*. Learning and Leadership Center.
- Belli, P., Anderson, J., Barnum, H., Dixon, J., Tan, J. P. (2004). *Economic Analysis of Investment Operations. Analytical Tools and Practical Applications*. The World Bank, WBI Development Series, Washington.
- Bivainis, J., Bivainis D. (2005). Verslo partnerių atrankos sistema. *Verslas: teorija ir praktika*. t. 6, Nr. 2, p. 67–76.
- Buškevičiūtė, E., Mačerinskienė, I. (2004). *Finansų analizė*. Kaunas: Technologija.
- Galinienė, B. (2004). *Turto ir verslo vertinimo sistema. Formavimas ir plėtros koncepcija*. Vilnius: Vilniaus universiteto leidykla.
- Ginevičius, R., Butkevičius, A., Podvezko, V. (2005). Naujų Europos Sąjungos šalių ekonominės plėtros daugiakriterinis įvertinimas. *Verslas: teorija ir praktika*, t. 6, Nr. 2, p. 85–93.
- Ginevičius, R., Podvezko V. (2005). Daugiakriterinio vertinimo rodiklių sistemos formavimas. *Verslas: teorija ir praktika*, t. 6, Nr. 4, p. 199–207.
- Richardson, B., Richardson, R. (1992). *Business Planning an Approach to Strategic Management*, London: Pitman Publishing.
- Rimkuvienė, D. (2005). *Žemės ūkio verslo projektų efektyvumo vertinimo modelis*, Kaunas, Žemės ūkio universitetas.
- Rutkauskas, A. V., Tamošiūnienė, R. (2002). *Verslo projektavimas*, Vilnius, Technika.
- Simanauskas, L. (1988). *Projekcinių sprendimų eksperimentinis įvertinimas*, Vilnius, Vilniaus universiteto leidykla.
- Simanauskas, L. (2002). *Kompiuterinis sprendimų modeliavimas*, Vilnius: Vilniaus universiteto leidykla.
- sidlauskas, S. (2003). Lietuvos verslo galimybės pasinaudoti ES finansine parama. *Verslas, vadyba ir studijos*, 133–140.
- Бланк, И. А. (2004). *Основы финансового менеджмента*, Киев, Ника-Центр.
- Бригхем, Ю., Гапенски, Л. (2004). *Финансовый менеджмент*, Санкт-Петербург, Экономическая школа.
- Ван Хорн, Дж. К. (2002). *Основы управления финансами*, Москва, Финансы и статистика.
- Виленский, П. Л., Лившиц, В. Н., Смоляк, С. А. (2004). *Оценка эффективности инвестиционных проектов*, Москва, Дело.
- Воронцовский, А. В. (2003). *Инвестиции и финансирование*, Издательство С.-Петербургского университета.
- Гинзбург, А. И. (2005). *Прикладной экономический анализ*, Санкт-Петербург, Питер.
- Дамодаран, А. (2004). *Инвестиционная оценка*, Москва, Альпина Бизнес Букс.
- Кемпбелл, Э. Лачс, К. С. (2004). *Стратегический синегизм*, Санкт-Петербург, Питер.
- Ример, М. И., Касатов, А. Д., Матиенко, Н. Н. (2005). *Экономическая оценка инвестиций*, Санкт-Петербург, Питер.
- Царев, В. В. (2004). *Оценка экономической эффективности инвестиций*, Санкт-Петербург, Питер.

## INVESTICINIŲ PROJEKTŲ EFEKTYVUMO APIBENDRINANTIS VERTINIMAS

Leonas Simanauškas, Skirmantas Šidlauskas

### Santrauka

Objektyvius atsakymus apie alternatyvių investicinių projektų efektyvumą galima gauti juos vertinant daugiakriteriniais būdais. Šie būdai leidžia išsamiai ir kompleksiskai įvertinti investicinius projektus, pateikiant vieną apibendrinamąjį rodiklį, kuris pakankamai objektyviai atspindi alternatyvaus projekto efektyvumą.

Straipsnyje analizuojami investicinių projektų efektyvumo vertinimo aspektai, pateikiami investicinių pro-

jektų, kurie finansuojami iš ES struktūrinių fondų, efektyvumo vertinimo daugiakriteriniu metodu rezultatai, aptariamos šio metodo taikymo galimybės.

Alternatyvių investicinių projektų efektyvumo vertinimo rezultatai parodė, kad daugiakriteriniai vertinimo būdai gali būti taikomi tokių projektų vertinimui, o kartu pritaikomi vertinant projektus, finansuojamus iš ES struktūrinių fondų.

## RESUMPTIVE EVALUATION OF INVESTMENT PROJECT EFFICIENCY

Leonas Simanauškas, Skirmantas Šidlauskas

### Summary

A large number of economic, financial, social, technological, ecological-environmental and other indicators define the efficiency of investment projects. According to some of the indicators, an alternative investment project is suitable for putting it into practice, according to others, it is not. Therefore, while evaluating investment projects (e. g., the projects that are financed by EU structural funds) it becomes difficult to choose the most effective projects implementation of which would bring the most significant benefit to an economy subject and to our country.

It is possible to get objective answers about the efficiency of alternative investment projects by evaluating them according to multi-criteria methods. With the help of such methods it is possible to evaluate investment projects comprehensively by presenting one generalizing indicator. It shows the efficiency of an alternative project fairly objectively.

The multi-criteria efficiency evaluation method presented in the article gave the possibility to evaluate the

efficiency of the projects chosen, and to set the priority sequence of these projects. From the analysis carried out, it is obvious that three investment projects are suitable for being financed and put into practice, and the remaining ones should be rejected or corrected.

The method for evaluating the efficiency of investment projects proposed by the authors has both theoretical and practical advantages (an extensive analysis can be carried out, a different classification of the evaluation criteria is possible, the weight of the criteria is evaluated, the possibility to include new evaluation criteria and their employment in practice (in the field of investment analysis)). The evaluation results of the investment projects show that the multi-criteria evaluation method is suitable for evaluating complex processes such as the efficiency of alternative investment projects. The proposed method of investment project evaluation can be adapted for various situations (e. g., for investment projects financed by EU funds).

*Įteikta 2006 m. birželio mėn.*

*Priimta spausdinti 2006 m. rugšėjo mėn.*