ANALYTICAL NETWORK PROCESS BASED ON BOCR ANALYSIS AS AN APPROACH FOR DESIGNING A FOREIGN DIRECT INVESTMENT POLICY

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Abstract. Foreign direct investment is significantly important for the emerging market countries or countries in transition. Scientific literature provides plenty of evidence that FDI may have both negative and positive influence on economic growth. However, research proves that just specific type of FDI may bring benefit to the host country. Thus, a targeted FDI policy is essential for directing foreign capital into problematic business areas or regions. The goal of the article is to propose a complex targeted FDI policy, the employment of which would give benefits to the host country and achieve its strategic goals. Benefit-opportunities-costs-risks analysis and analytic network process method are used for the empirical research. Final results reveal that Lithuania, attracting FDI into research and development area, gains great benefits and exploits opportunities. At the same time, the highest costs might be generated while implementing a FDI policy in this area. A FDI policy towards service sectors would cause the least amount of risks. These results are significant for academics as the basis for further research, and decisions-makers as guidance for the development of the national FDI policy.

Keywords: FDI, FDI policy, multinational corporations, MCDM, decision-making tool, BOCR, ANP, Lithuania.

JEL Classification: C61, F12, H59, M48.

Introduction

Interest in attracting foreign direct investment (FDI) has increased since the 1980s, as it is one of the external financing sources for developing and developed countries. However, scientists (Long *et al.* 2015; Aurangzeb, Stengos 2014; Cooray *et al.* 2014; Du *et al.* 2014; Fenny *et al.* 2014; Medvedev 2010) still argue whether the impact of foreign capital on economic growth is positive or negative. Some researchers state that inward FDI is limited to a short-term positive impact, or positive effect of FDI is possible only in long-term (Belloumi 2014; Merlevede *et al.* 2014), while others (Long *et al.* 2015; Zhang 2014) maintain that the performance of multinational corporations (MNCs) cannot be harmful for the host country at all, and FDI has only positive influence on

economic growth. Gui-Diby (2014) claims that the impact of FDI on economic growth may be twofold. In order to achieve positive effect of FDI, he recommends designing a FDI policy and implementing some measures. The representatives of Dependencia School disagree with Gui-Diby (2014) and maintain that host country by attracting FDI becomes dependent on MNCs. Meanwhile, Aurangzeb and Stengos (2014) conclude that countries with higher levels of FDI inflows experience higher productivity in the export sector compared to those with low level of FDI inflows. Zhang's (2014) study confirms that higher FDI flows positively affect industrial performance and positive impact increases in time. For example, Markusen (2013) especially emphasizes the host country's need for external funding that might be used to upgrade technologies and promote innovation. In this sense, the host country should attract specific MNCs motivated towards expanding business through research and development. This means that the host country should focus on the measures, which would attract targeted investors. Moreover, a strategy or a policy would help define goals for selecting proper FDI incentives and creating a framework for implementing them. The FDI policy assumed by the host country and applicable measures enables international companies to integrate into the host market as well as to expand production by using local labour force, land and capital. Meanwhile, the practice shows that the host governments forming their FDI policy expect positive impact on economic growth from FDI, and do not evaluate the costs and risks, which may occur after employing specific incentives. Thus, the employed incentives may be treated as investments in FDI, or in other words, investments in attracting MNCs. For this reason, these incentives may not pay off, but result in a loss. In some cases host governments tend to attract foreign capital as much as possible. For example, Belloumi (2014), analysing the measures for attracting FDI in Tunisia, finds that there is no significant Granger causality from FDI to economic growth in the short run. Even more, he admits that empirical results failed in proving positive spillovers from FDI. Meanwhile, Bjorvan and Eckel (2006) have some doubts that the policy influences FDI flows. These scientists define two types of FDI policies: bottom-up and top-down. The latter is applied using the existing business environment and directing FDI to particular regions or business sectors. In order to attract MNCs into R&D, a bottom-up policy is employed. Other scientists (Du *et al.* 2014), examining whether an industrial policy affects the magnitude and directions of FDI spillovers, discover that tariff reform increased the productivity impacts of FDI's backward spillovers in China. Thus, the conclusion might be drawn that the changing direction of a FDI policy affects inward foreign capital flows. The investigation of Long *et al.* (2015) proves that even domestic companies may benefit from adopted FDI incentives. They discover that Chinese domestic firms located in regions with a higher level of FDI tend to enjoy a lower level of tax and fee burdens, less arbitrariness in such burdens, as well as better legal protection. Cooray *et al.* (2014) notice that developing countries tend more intensively compete for FDI between each other than highly developed countries. However, the drastic application of one or other policy type may cause a "race to the bottom". Due to this phenomenon, government regulation declines, the costs of attracting FDI increases and the local market faces a high level of competition. In order to form a targeted FDI policy, it is required to choose a proper method and methodology. However, it is

noticeable that factors, influencing the formation of FDI, are being evaluated perfunctorily. The problem arises during the selection of methods for a FDI policy formation. Frequently, methods, based on correlation-regression analysis, are applied in the scientific literature. However, this analysis is more helpful in assessing relationship between individual factors than complex components of the FDI policy.

The goal of the article is to form a complex targeted FDI policy, the employment of which would bring benefits to the host country and allow achieving its strategic goals. The following methods are applied in the research: benefit-opportunities-costs-risks (BOCR) analysis and analytic network process (ANP) method.

1. Literature review

1.1. Models for designing a FDI policy

Popular econometric and multi-criteria methods are widely adopted for analysis of a FDI policy and the impact of foreign capital on economic growth. However, a significant number of researchers limit their investigations by exploring the FDI impact without considering the FDI policy or measures for attracting MNCs. In this way, the question regarding the effectiveness of the FDI policy remains unanswered. It is not clear whether negative or positive influence of FDI on economic growth is caused by the FDI policy and incentives or not. Filippov and Costa (2007) define two approaches to the FDI policy: quantitative and qualitative approaches. However, most of the researchers do not express their attitude towards attracting quantitative or qualitative FDI flows. In many cases, both quantitative and qualitative approaches are integrated and applied together. Scientists Wei and Andresso-O'Callaghan (2008) explore a regional FDI policy, which as an object of research might be defined as a quantitative model of the FDI policy. However, the factors determining the effectiveness of FDI policy (FDI/GDP in specific region, education level, comparative advantage of export, efficiency of wages) are broadly in line with the quantitative model of the FDI policy. These researchers for this study choose the Euclidean distance model and the linear regression method. Cooray *et al*. (2014), analysing the drivers for liberalising of the FDI policy, use spatial econometric estimation for the panel dataset of 148 developed and developing countries. This model might be characterised as quantitative as these scientists focus on the liberalising regulatory framework and the use of the "open-door" approach. They claim that due to data limitation, it is difficult to identify whether countries tend to compete for different types of FDI. Therefore, designing FDI policy requires detailed and precise assessment of various factors, which are interfaced by attraction of foreign capital. However, a significant number of factors complicates formation of the FDI policy. For this reason, it is necessary to create hierarchy systems of factors that enable decision-makers to take a deeper look at the problem. For creating hierarchies and such an analysis of factors, the most suitable methods are multi-criteria decision making methods (MCDM). Although, these methods are adopted in various areas, determining qualitative incentives to attract FDI, the most suitable method is yet to be selected. Scientific literature (Zavadskas *et al*. 2014; Peng, Tzeng 2013) broadly classifies MCDM

methods into two categories: discrete MCDM or discrete MADM (Multi-Attribute Decision Making) and continuous MODM (Multi-Objective Decision Making) methods. Zavadskas *et al.* (2014) divide MCDM into four groups:

1. Methods based for quantitative measurements. In this case, every alternative is estimated in quantitative methods and differences between these dimensions are evaluated (Ginevičius, Podvezko 2008);
2. Qualitative methods that are based on the opinion of experts allow determining the best alternative or several alternatives;
3. Comparative preference methods;
4. Methods which are based on qualitative measurements without using quantitative measures. This group involves verbal methods, which are applied under the high degree of uncertainty.

ANP and AHP methods are widely used in making decisions on strategic issues (Ergu *et al.* 2014; Lee 2013; Kahraman *et al.* 2013; Saaty 2005). Wind and Saaty (1980) apply the AHP method to create and evaluate a marketing strategy. Therefore, it does not allow evaluating inner-relationships between sub-factors and alternatives. Later, Saaty (1997) modified AHP and proposed the ANP method. He noticed that in these days, simple hierarchic structures are constructed of a goal, criteria and alternatives are mainly used by decision-makers who tend to simplify the complexity of a problem. Solutions are acquired from multilevel and simple hierarchy structure may differ. Even though, solutions acquired from more complicated hierarchies and networks may be completely different (Saaty 2006). Nevertheless, Saaty (2005, 2006) maintains that decision-makers tend to escape difficult hierarchy and simplify them; ANP is widespread in the scientific literature.

To sum up, the presumption can be made that it is appropriate to apply a multi-criteria decision making method for forming a FDI policy. The authors apply the ANP method, which enables them to assess both external and internal relationships of the components of the same criterion.

1.2. BOCR analysis as a basis for creating criteria system

BOCR analysis is often considered as a narrow financial tool. However, this underestimates its versatility in addressing intangible values. Hence, benefit-cost analysis may be defined as a decision-making tool that may be adopted in various areas. New factors, such as opportunities and risks, extend this analysis for estimating future outcomes of the project (strategy, policy or scheme). In addition, it allows evaluating two or more alternative projects at the same time. Opportunities usually catch expectations about positive spin-off projects and revenues in the future, while benefits represent current revenues or those profits from positive developments (Ergu *et al.* 2014). Risks in BOCR analysis are linked to the expected negative consequences in the future, during the development of a project. Although, a profit is frequently associated with company's benefit at the end of a financial year, in the case of a FDI policy formation, it may be treated as financial and non-financial benefits received during the project implementation. A full BOCR analysis is similar to that of SWOT. Although, both of them are usually applied

on the micro-level just for assessing internal and external factors that affect performance of a company. However, these analyses may be perfectly adopted for evaluation at the macro level. For example, while developing the strategy for Taiwanese biotech pharmaceutical industry, Lee (2013) applied the fuzzy ANP method and integrated the SWOT analysis, which forms the basis for determining the sub-criteria. The ANP method is also adapted for the assessment of investment risk and decision-making (Ergu *et al.* 2014). Shiue and Lin (2012) apply ANP under BOCR basis for evaluating the optimal recycling strategy in the solar energy industry. The authors of the article propose to divide benefits into political, economic, social and technological. These four groups of factors may also be used to evaluate opportunities and costs.

2. Methodology

The ANP method is applied in five steps. The first step is composition of the criteria system, identification of sub-criteria on BOCR basis and presentation of alternatives.

The second step is devoted for identifying significance index through pair-wise comparison and calculation of the priority vector. The ANP method is based on the matrix of pair-wise comparison. The 1–9 point scale (Table 1) is used for the pair-wise comparison, where 1 refers to two factors of equal importance, and 9 refers to the other factor of full importance (Saaty 1980). The elements are evaluated in respect of the aim, and later, sub-criteria are assessed in respect of the aim and with each other by applying the comparative method in each group.

Table 1. Description of the pair-wise comparison scale

Intensity of importance	Definition	Description
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favour one over another
5	Strong importance	Experience and judgment strongly favour one over another
7	Very strong demonstrated importance	An activity is favoured very strongly over another; its dominance demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	For compromise between the above values	Sometimes one needs to interpolate a compromise judgment numerically because there is no good word to describe it

Source: Saaty (1980).

Experts evaluate importance of every factor that is the dominance over the other. Coefficient a_{ij} symbolises the importance of the component i (row) over the component j (column):

$$a_{ij} = \frac{w_i}{w_j}. \tag{1}$$

After completion of the matrix *A*, an estimate of the relative importance of the elements compared is calculated using formula 3. To form the initial super matrix, then *w* is normalised to define the local priority vector (Ergu *et al.* 2014) (2) and (3):

$$A \cdot w = \lambda_{max} \cdot w, \tag{2}$$

$$A = \begin{bmatrix} W_1/W_1 & \cdots & W_1/W_n \\ \cdots & \cdots & \cdots \\ W_n/W_1 & \cdots & W_n/W_n \end{bmatrix} = \begin{bmatrix} 1 & \cdots & a_{1n} \\ \cdots & \cdots & \cdots \\ 1/a_n & \cdots & 1 \end{bmatrix}, \tag{3}$$

where: *A* – pair-wise comparison matrix; λ_{max} – the maximum eigenvalue of the matrix *A*; *w* – eigenvector.

In the third step, the consistency index *CI* (4) and the consistency coefficient CR (5) are calculated. These two parameters define the reliability of the model:

$$CI = (\lambda_{max} - n)/(n - 1), \tag{4}$$

$$CR = \frac{CI}{RI} = \frac{(\lambda_{max} - n)/(n-1)}{RI}. \tag{5}$$

When the value of the consistency coefficient CR is lower than 0.1, the matrix satisfies the condition (Table 2). If the matrix consistency test fail, incompatible elements should be identified and reviewed. Otherwise, the final results will be unreliable (Ergu *et al.* 2014). R is the average random index, which is based on the matrix size; *n* is the number of factors (Saaty 2005).

Table 2. The average random index

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.4	1.45	1.49

Source: Shiue, Lin (2012).

In the fourth step, the supermatrix is constructed. The weights in the supermatrix (6) show the interactions in the system. To obtain global priorities in a system with interdependent influences, the local priority vectors are entered in the appropriate columns of a matrix, known as the supermatrix. As a result, the supermatrix is actually a partitioned matrix, where each matrix segment represents a relationship between two nodes (components or clusters) in a system. The standard supermatrix is in formula 7. The components of a decision system are C_n which have *N* clusters; e_{Nn} denotes *n* – element in *N* – cluster N_{ij} is a block matrix, which is composed of weights of priority vectors *w*. In the ANP, if a comparison matrix passes the consistency test, the priorities that are derived from the comparison matrix are added as parts of the columns of the supermatrix of a network. Otherwise, this comparison matrix has to be revised by experts. Therefore,

the consistency tests will be much more complicated in the ANP case than in the AHP, since there are more comparison matrices in the ANP, which can be derived from the following supermatrix of a network:

$$W = \begin{array}{c} C_1 \\ C_k \\ \vdots \\ C_n \end{array} \begin{array}{c} e_{11} \\ e_{12} \\ \vdots \\ e_{1m1} \\ e_{k1} \\ e_{k2} \\ \vdots \\ e_{kmk} \\ \vdots \\ e_{n1} \\ e_{n2} \\ \vdots \\ e_{nmn} \end{array} \begin{bmatrix} W_{11} & \cdots & W_{1k} & \cdots & W_{1n} \\ \vdots & & \vdots & & \vdots \\ W_{k1} & \cdots & W_{kk} & \cdots & W_{kn} \\ \vdots & & \vdots & & \vdots \\ W_{n1} & \cdots & W_{nk} & \cdots & W_{nn} \end{bmatrix}. \tag{6}$$

The fifth step is selection of alternatives. The authors of the article propose four alternatives for the formation of a comprehensive FDI policy: the FDI policy directed to R&D; the FDI policy directed to the service sector; the FDI policy directed to export; the FDI policy directed to the improvement of the investment environment.

For making the final decision, Wijnmalen (2007) recommends to employ five different synthesis methods: additive (7), probabilistic additive (8) subtractive (9), multiplicative (10), and multiplicative priority powers (11).

Additive method:

$$P_i = bB_i + oO_i + c\left[\left(1/C_i\right)_{\text{normalized}}\right] + r\left[\left(1/R_i\right)_{\text{normalized}}\right], \tag{7}$$

probabilistic additive:

$$P_i = bB_i + oO_i + c\left(1 - C_i\right) + r\left(1 - R_i\right), \tag{8}$$

subtractive:

$$P_i = bB_i + oO_i - cC_i - rR_i, \tag{9}$$

multiplicative priority powers:

$$P_i = B_i^b O_i^o \left[\left(1/C_i\right)_{\text{normalized}}\right]^c \left[\left(1/R_i\right)_{\text{normalized}}\right]^r, \tag{10}$$

multiplicative:

$$P_i = \frac{B_i O_i}{C_i R_i}, \tag{11}$$

where b, o, c, r are normalized weights of merit B, O, C and R, respectively; B_i, O_i, C_i and R_i represent the synthesized results of the alternative i under merit B, O, C and R.

3. Case study

The entire ANP model consists of a two level decision-making network (Fig. 1). The top-level structure has four merits Benefit-Opportunities-Costs-Risks. The subnets under each of the four BOCR merits are composed of their respective clusters and elements. The goal of the model is to select the best FDI policy for Lithuania. The strategic criteria are created along with the goal. They are: high quality foreign direct investment, development of human resource capital and the complex development of production factors. The authors of the article do not set strategic sub-criteria. The strategic criteria are interpreted as follow:

1. The high quality investment is determined as an investment that creates jobs, which require high-qualified labour force, transfer of knowledge, upgraded technologies and promotes high-tech;
2. The development of human resource capital refers to the development of competence, knowledge and skill of groups of working people;
3. The complex development of the production factors. The classical or quantitative production factors cover land, capital and labour force. Meanwhile, the authors of the article focus on the qualitative FDI policy approach, which defines the following production factors: human capital, knowledge and infrastructure.
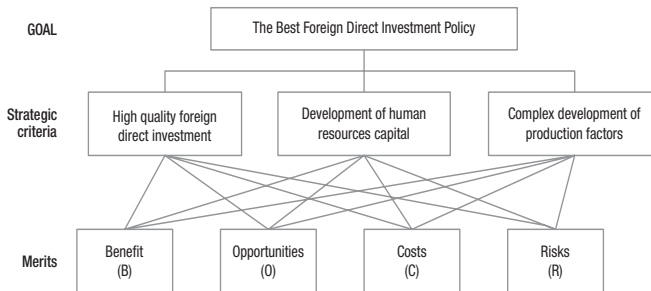

Fig. 1. The control hierarchy
Source: compiled by the authors.

3.1. Benefits model

The perspective of benefits (Fig. 2) is comprised of political, economic, social and technological benefits obtained from implementing the FDI policy. Political benefits cover the increase of international competitiveness, the increase in political stability and the growth of wages. However, most of countries forming their FDI policy focus on economic benefits. Although, scientific literature emphasises creation of new jobs, in this case, the authors of the article define other supplementary economic benefits: improved quality of life, closing of the gap between high-income and middle-class groups, decline in regional exclusion and creation of new jobs. Social benefits are closely related to economic ones, especially, the growth of emotional satisfaction that arises from the improved quality of life. Tolerance toward other cultures refers to the increasing number of foreign employees and employers that allows cognizing businesses and cultural features. Technological benefits are particularly important in the research and development
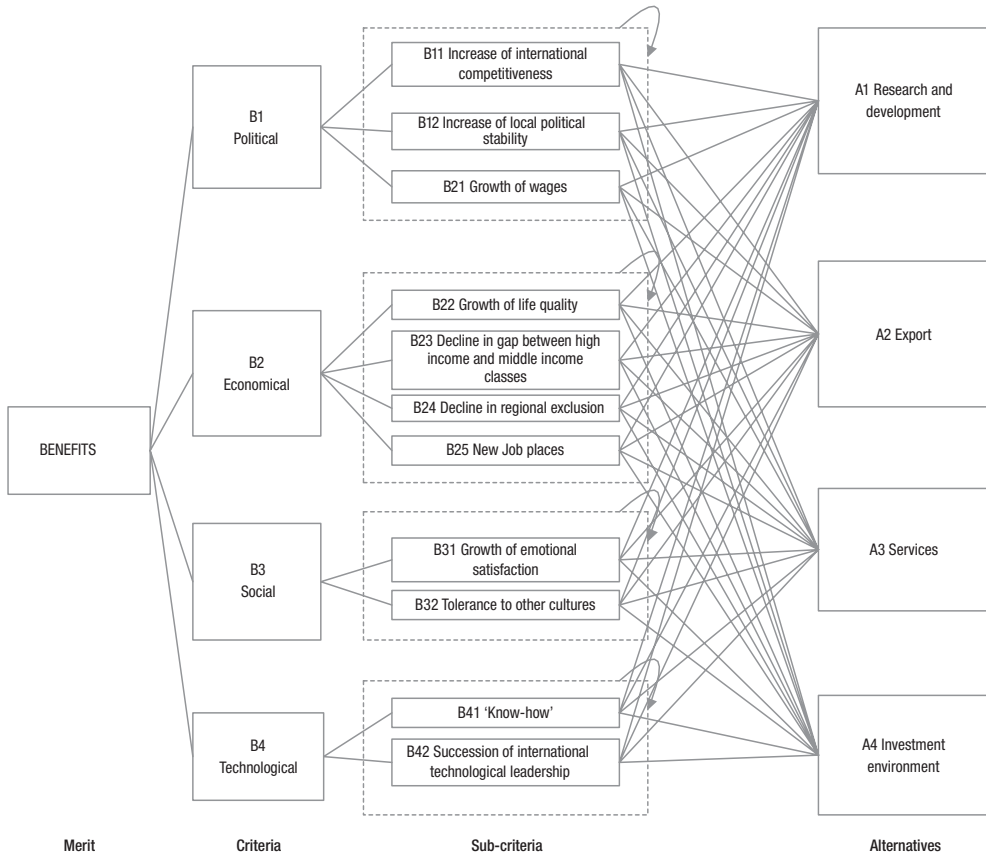
Fig. 2. Benefit sub-network
Source: compiled by the authors.

area. Even more, local companies "copy" technologies from MNCs and adopt them in their own businesses. These sub-criteria are determined in respect to strategic goals. In addition, all benefits may be achieved implementing a particular FDI policy. The ANP method, as it was mentioned above, enables to evaluate inner-relationship and dependence between sub-criteria in respect of alternative FDI policies. In addition, the semi-circular arrows along the section of sub-criteria graphically indicate the sub-network. In order to determine the inner dependence between sub-criteria, and to compare criteria priorities, the survey was carried out during which eight experts were interviewed. The results show that technological benefits are the most important in forming a FDI policy (Table 3).

The matrix has passed consistency index CI and consistency coefficient CR tests, thus, the authors of the article formed the supermatrix and the priorities of sub-criteria and criteria were obtained (Table 4).

Despite, the fact, that the technological benefits are the most important achieving the strategic goals, the results reveal that attracting MNCs in R&D would give more political benefits than others (Table 5).

Table 3. Pair-wise comparison and determination of priorities in the line with the benefit merit

	B1 Political	B2 Economic	B3 Social	B4 Technological	Normalized	Rank
B2 Economic	2	1.0	2	1/2	0.271	2
B1 Political	1.0	1/2	2	1/2	0.191	3
B3 Social	1/2	1/2	1.0	1/3	0.120	4
B4 Technological	2.0	2.0	3.0	1.0	0.418	1

Table 4. Priorities of the elements in the benefit sub-network

Name	Normalized by cluster	Limiting
B1 Political control sub-criteria	**0.351**	0.098
B11 Increase of international competitiveness	0.667	0.018
B12 Increase of local political stability	0.333	0.008
B2 Economic control sub-criteria	**0.213**	0.059
B21 Growth of wages	0.128	0.045
B22 Growth of life quality	0.170	0.060
B23 Decline in gap between high income and middle income classes	0.179	0.063
B24 Decline in regional exclusion	0.203	0.007
B25 New Job places	0.319	0.011
B3 Social control sub-criteria	**0.161**	0.045
B31 Growth of emotional satisfaction	0.800	0.008
B32 Tolerance to other cultures	0.200	0.002
B4 Technological control sub-criteria	**0.275**	0.077
B41 'Know-how'	0.750	0.011
B42 Succession of international technological leadership	0.250	0.036

Table 5. Prioritization of the alternatives under benefit network

	Normalized by cluster	Rank
A1 Export	0.204	3
A2 Investment environment	0.261	2
A3 Research and development	0.335	1
A4 Services	0.199	4

Especially, it would increase international competitiveness in the same geographical area. Although, attraction of FDI into research and development area would bring great benefits for Lithuania, final results may be different.

3.2. Opportunities model

The perspective of opportunities (Fig. 3) is similar to that of benefits. Moreover, sub--networks of benefits and opportunities are closely related. For example, one of the political benefits – improved international competitiveness – causes the change in international image and international recognition. Some countries use the image of a reputable company, which operates in the local market. Implementing its FDI policy and attracting FDI, the host country would obtain such economic opportunities: the growth of export in innovative business sectors, the increase in labour productivity, the growth of international trade, the growth of inward FDI, the growth of traditional business sectors and reinvestment. The first one mentioned is closely related to the technological benefits as well as technological opportunities. Meanwhile, one of the social opportunities is the decrease in emigration, which would result from improving the quality of life.
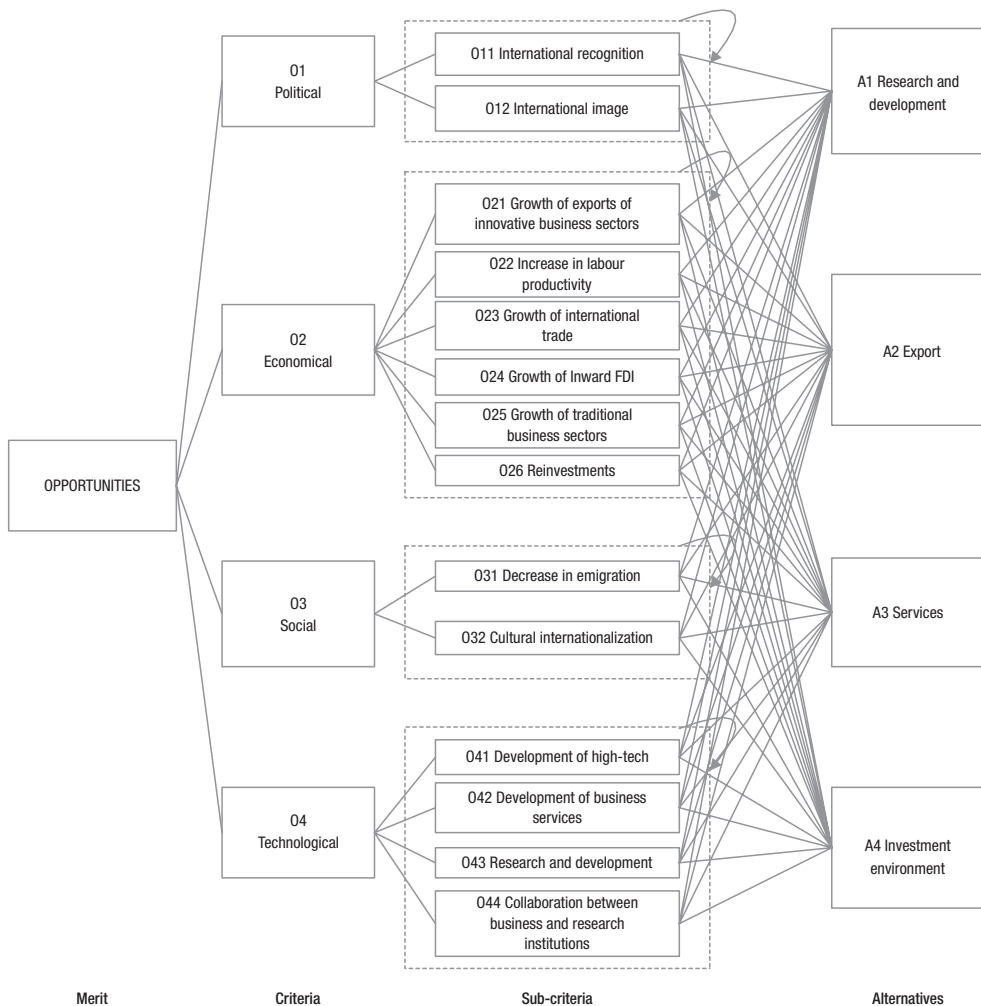

Fig. 3. Opportunity sub-network
Source: compiled by the authors.

As in the benefit sub-network, the matrix has passed consistency index CI and consistency coefficient CR tests, thus the priorities of the elements in opportunity sub-network were calculated (Tables 6 and 7).

The results in the opportunity sub-network confirm that Lithuania would succeed in forming the FDI policy oriented towards the research and development (Table 8). In addition, the technological opportunities might be exploited. It would lead to the growth of export in innovative business sectors. Although, the benefits approve the opportunities, the costs and risks supposed to be evaluated regarding FDI attraction into R&D sectors.

Table 6. Pair-wise comparison and determination of priorities in the line with the opportunities merit

	O1 Political	O2 Economic	O3 Social	O4 Technological	Normalized	Rank
O1 Political	1.0	1/2	1.0	1/3	0.142	3
O2 Economic	2.0	1.0	3	1.0	0.348	2
O3 Social	1.0	1/3	1.0	1/3	0.128	4
O4 Technological	3.0	1.0	3	1.0	0.383	1

Table 7. Priorities of the elements in the opportunity sub-network

Name	Normalized by cluster	Limiting
O1 Political control sub-criteria	**0.178**	0.057
O11 International recognition	0.500	0.007
O12 International image	0.500	0.007
O2 Economic control sub-criteria	**0.321**	0.103
O21 Growth of exports of innovative business sectors	0.295	0.018
O22 Increase in labour productivity	0.115	0.005
O23 Growth of international trade	0.118	0.005
O24 Growth of inward FDI	0.148	0.006
O25 Growth of traditional business sectors	0.122	0.005
O26 Reinvestments	0.202	0.008
O3 Social control sub-criteria	**0.145**	0.046
O31 Decrease in emigration	0.50	0.004
O32 Cultural internationalization	0.50	0.004
O4 Technological control sub-criteria	**0.356**	0.114
O41 Development of high-tech	0.286	0.014
O42 Development of business services	0.143	0.007
O43 Research and development	0.286	0.014
O44 Collaboration between business and research institutions	0.286	0.014

Table 8. Prioritization of the alternatives under opportunity sub-network

	Normalized by cluster	Rank
A1 Export	0.167	4
A2 Investment environment	0.255	2
A3 Research and development	0.365	1
A4 Services	0.213	3

3.4. Costs model

The sub-network of costs (Fig. 4) differs from benefits and opportunities in respect of criteria. The social and technological criteria were replaced to financial and international ones. Although, the international and financial costs look similar, the financial costs
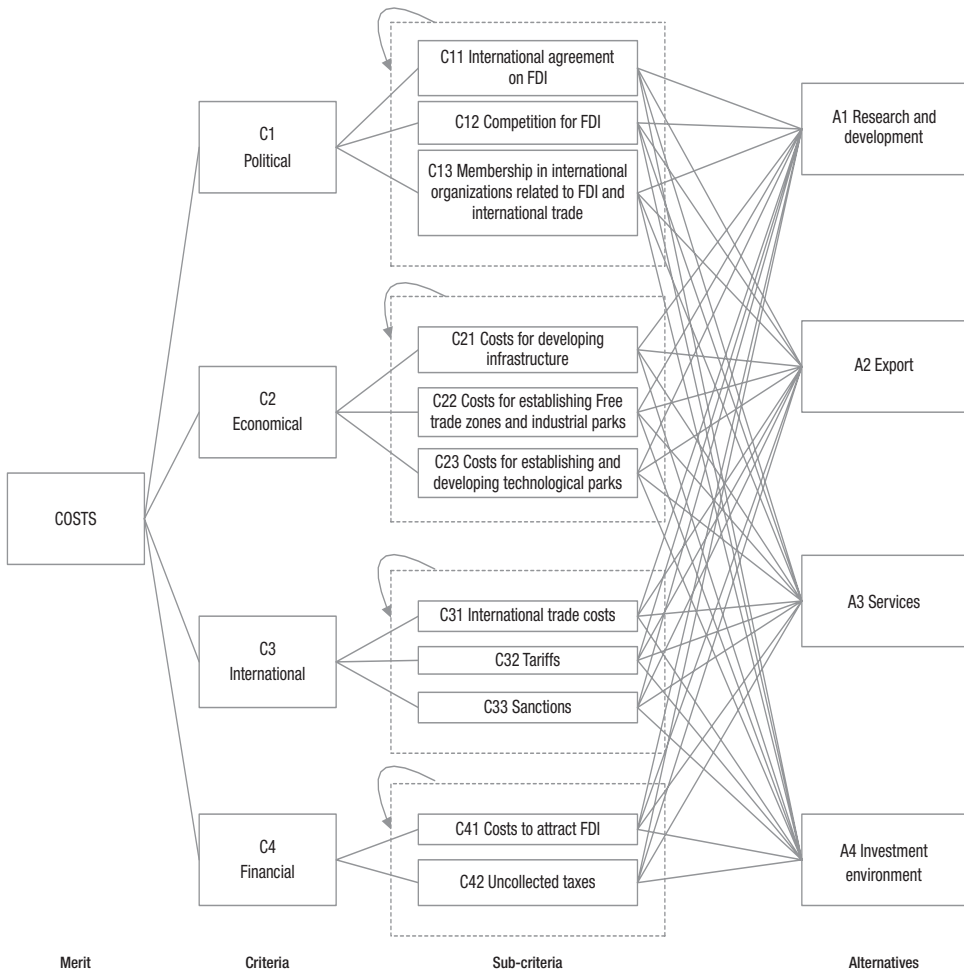

Fig. 4. Cost sub-network
Source: compiled by the authors.

mostly refer to the local rather than international market. The costs to attract FDI cover subsidies and financial support. Meanwhile, the uncollected taxes are associated with tax holidays. Other groups of criteria are in the line with the benefits and the opportunities.

The matrix has passed consistency index CI and consistency coefficient CR tests; thus, priorities of the elements in the cost sub-network and the prioritization of the alternatives under the cost sub-network were evaluated (Tables 9 and 10).

The results reveal that the highest costs would be generated while implementing the FDI policy targeted at R&D and the lowest – towards service businesses (Table 11). It is determined by high cost of international trade and international agreements. Nevertheless, Lithuania would benefit and exploit opportunities in developing the FDI policy towards R&D and would also have significant costs.

Table 9. Pair-wise comparison and determination of priorities in the line with the costs merit

	C1 Political	C2 Economic	C3 International	C4 Financial	Normalized	Rank
C1 Political	1.0	4	1.0	2	0.360	2
C2 Economic	1/4	1.0	1/3	1/2	0.098	4
C3 International	1.0	3.0	1.0	3	0.377	1
C4 Financial	1/2	2.0	1/3	1.0	0.165	3

Table 10. Priorities of the elements in the cost sub-network

Name	Normalized by cluster	Limiting
C1 Political control sub-criteria	**0.275**	0.08
C11 International agreement on FDI	0.332	0.013
C12 Competition for FDI	0.139	0.006
C13 Membership in international organisations related to FDI and international trade	0.528	0.021
C2 Economic control sub-criteria	**0.219**	0.07
C21 Costs for establishing and developing technological parks	0.400	0.008
C22 Costs for developing infrastructure	0.200	0.004
C23 Costs for establishing Free trade zones and industrial parks	0.400	0.008
C3 International control sub-criteria	**0.334**	0.107
C31 International trade costs	0.413	0.021
C32 Tariffs	0.259	0.013
C33 Sanctions	0.327	0.018
C4 Financial control sub-criteria	**0.171**	0.054
C41 Costs to attract FDI	0.500	0.006
C42 Uncollected taxes	0.500	0.006

Table 11. Prioritization of the alternatives under the cost sub-network

	Normalized by cluster	Limiting
A1 Export	0.232	3
A2 Investment environment	0.258	2
A3 Research and development	0.319	1
A4 Services	0.191	4

3.5. Risks model

The risk sub-network (Fig. 5) covers six groups of criteria. The failure to manage the FDI policy and environmental risks are included additionally. The first one is introduced as Lithuania has failed in managing several strategic projects. Furthermore, the situati-
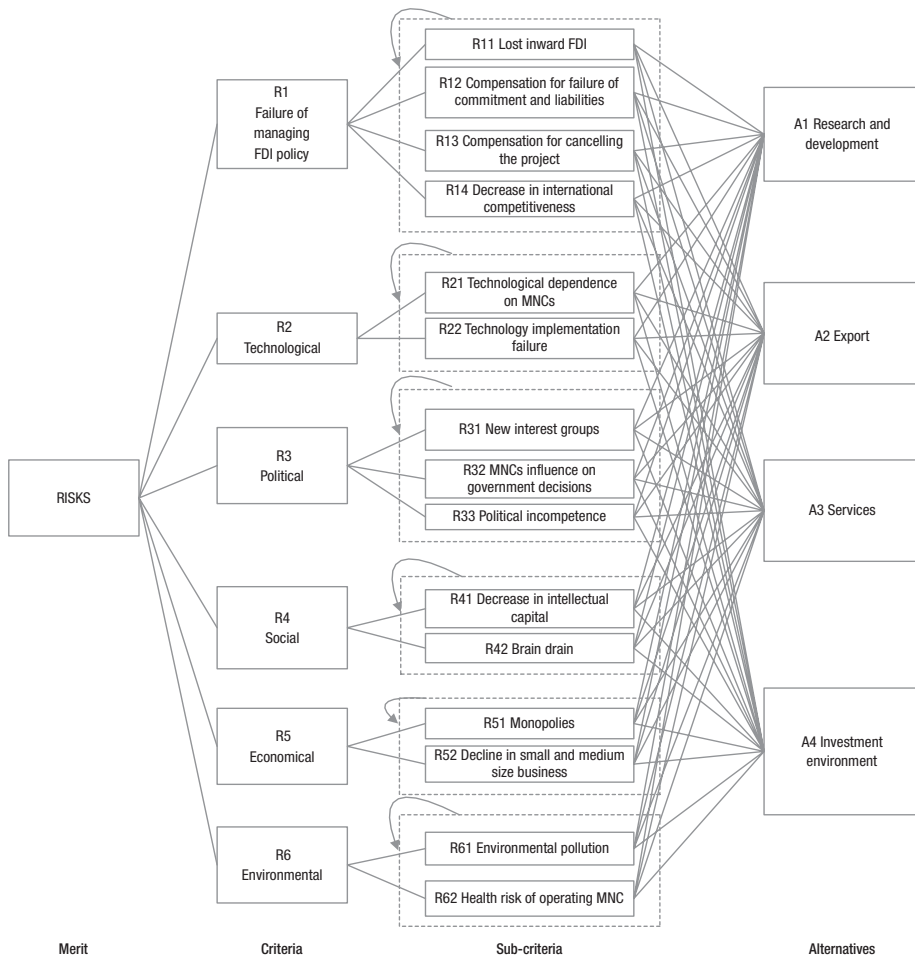

Fig. 5. Risk sub-network
Source: compiled by the authors.

ons like these cause many negative consequences, especially financial ones. These are the compensation for failure of commitment and liabilities and compensation for cancelling the project. Both of them have a strong inner-relationship with the loss of inward FDI, which determines decrease in international competiveness. The environmental risks appear from MNCs established in the manufacturing area.

According to the results (Table 12), the failure to manage FDI projects has the highest risk in achieving strategic goals. Furthermore, political risks are closely related to the first group of criteria as the rate differs by 0.02 points.

However, Lithuania (Table 13 and Table 14) may face these risks while implementing the FDI policy towards MNCs companies that are interested in expanding their exports. The FDI policy towards service sectors would cause the least amount of risks.

The authors of the article obtained final results following the methodology. The final synthesis (Table 15) reveals that the most appropriate FDI policy for Lithuania, which would enable to achieve or partly achieve strategic goals and to avoid risks.

Table 12. Pair-wise comparison and determination of priorities in the line with the risk merit

	R1 Failure to manage the FDI policy	R2 Techno- logical	R3 Political	R4 Social	R5 Econo- mic	R6 Enviro- nmental	Norma- lized	Rank
R1 Failure to manage the FDI policy	1.0	4	1.0	2	1.0	3	0.253	1
R2 Technological	1/4	1.0	1/3	1.0	1/2	3	0.106	5
R3 Political	1.0	3.0	1.0	3	1.0	3	0.251	2
R4 Social risk	1/2	1.0	1/3	1.0	1/2	2	0.108	4
R5 Economic	1.0	2.0	1.0	2.0	1.0	3	0.217	3
R6 Environmental	1/3	1/3	1/3	1/2	1/3	1.0	0.064	6

Table 13. Priorities of the elements in the risk sub-network

Name	Normalized by cluster	Limiting
R1 Failure of managing FDI policy	**0.258**	0.033
R11 Lost inward FDI	0.216	0.028
R12 Compensation for failure of commitment and liabilities	0.199	0.026
R13 Compensation for cancelling the project	0.201	0.026
R14 Decrease in international competitiveness	0.384	0.050
R2 Technological risk	**0.115**	0.015
R21 Technological dependence on MNCs	0.692	0.023
R22 Technology implementation failure	0.308	0.010

Name	Normalized by cluster	Limiting
R3 Political risk	**0.228**	0.029
R31 New interest groups	0.580	0.059
R32 MNCs influence on government decisions	0.316	0.032
R33 Political incompetence	0.104	0.011
R4 Social risk	**0.132**	0.017
R41 Decrease in intellectual capital	0.419	0.015
R42 Brain drain	0.581	0.021
R5 Economic risk	**0.199**	0.025
R51 Monopolies	0.783	0.07
R52 Decline in small and medium size business	0.217	0.02
R6 Environmental risk	**0.067**	0.009
R61 Environmental pollution	0.840	0.037
R62 Health risk of operating MNC	0.160	0.007

Table 14. Prioritization of the alternatives under the risk sub-network

	Normalized by cluster	Limiting
A1 Export	0.293	1
A2 Investment environment	0.278	2
A3 Research and development	0.220	3
A4 Services	0.209	4

Table 15. Final results of synthesis

	Additive	Probabilistic additive	Subtrac-tive	Multiplicative priority powers	Multip-licative	Average
	Priority	Priority	Priority	Priority	Priority	Priority
Research and development	0.3674	0.5982	0.0162	0.2292	8.4779	2.1942
Rank	*1*	*1*	*3*	*3*	*1*	*1*
Export	0.1839	0.4319	0.0251	0.2420	0.5000	0.2297
Rank	*4*	*4*	*2*	*1*	*4*	*3*
Services	0.3160	0.5647	−0.0125	0.2417	4.3151	1.0268
Rank	*2*	*2*	*4*	*2*	*2*	*2*
Investment environment	0.2321	0.4870	0.1061	0.2280	1	0,2165
Rank	*3*	*3*	*1*	*4*	*3*	*4*

Although the risk is the highest in adopting the FDI policy directed towards R&D, the final synthesis reveals that Lithuania would mostly benefit from this type of policy. In this case, risks are associated with possible failure of implementing the FDI policy, which may decrease the competitiveness on the global scale. On the other hand, successful implementation of targeted FDI policy towards R&D would guarantee the growth of exports of innovative products, which positively affects the global competitiveness.

Conclusions

The issue of foreign direct investment has been intensively analysed since the 80s when only the positive impact of FDI on a host country was perceived. However overtime, situation has changed; thus, the scientific literature raises the question regarding attracted FDI. However, the main problem for developing the framework for the FDI policy is to select the appropriate method and to create the methodology. Two complementary methods were applied in the article. The first one is BOCR; on its basis, the criteria system was formed. The second one is the multi-criteria decision making method ANP. This method is widely adopted in making of decisions on strategic issues. Its popularity might be explained by the fact, that the ANP method allows evaluating external and internal relationship of components of the same criterion. The authors propose the following alternatives for the FDI policy: the FDI policy targeted at service sectors; the FDI policy target at promotion of export; the FDI policy targeted at R&D and the FDI policy targeted at improvement of the business environment. Final results demonstrate that Lithuania would achieve its strategic goals and benefit from implementing the FDI policy, which is targeted at research and development. However, its adoption would generated greater costs than others policies. Meanwhile, the FDI policy targeted at promotion if services would lead to lowest risks and costs compared to other policies. At the same time, it would give the least amount of benefits.

Generalizing, the results of the research indicate that attracting FDI to R&D would be the most effective policy that would bring a positive long-term impact of FDI on economic development of the country.

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