MANAGING STAKEHOLDERS IN COMPLEX INVESTMENTS PROJECTS

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Abstract. The article presents the stakeholder management model for complex investment projects. The proposed model is aimed at strengthening in essence the justification of managerial decisions subject to the choice of the stakeholders and their subsequent coaction throughout the whole investment project management cycle. Respectively the model concerned is regarded as multiple criteria ranking task of possible variants of choice of stakeholders (as a one of indispensable factors) needed when seeking for effective implementation of complex investments. In order to solve this task the cooperation-target-homogeneity function and three-stage-criteria system is adapted. The latter measures are also supported by the quantitative methods to be used when assessing potential stakeholders and forming basis for objective decision making.

Keywords: stakeholder, cooperation, investments, project, model, multiple criteria assessment.

JEL Classification: D22; D23; D81; D92; L14; L24.

1. Introduction

Economies, markets with their participants and activities integrating, globalizing, interacting dynamically among each other can be considered as one of critical regurialities of this century.

In the context of these events economic systems, their members develop into internationally and globally acting ecosystems seeking for specific mutual business objectives. The latter are transformed into particular investment projects which are often complex in scale and scope as well as in terms of requirements of their implementation (eg.: "renovation of public & private buildings" "twinning", "cross-border", "joint implementation", "public private partnership", wide spectrum of programs and projects subject to European structural investments funds and other similar alike programs and projects (EC 2009, 2013; Tamošiūnas 2010). Under such circumstances there is crucial to have a sustainable business network of counterparties. Sustainability of the network is based on objectives for value, integrity of technologies and other resources, critical mass of inner potential and external opportunities, joint learning and continuous performance improvement (Zavadskas *et al.* 2008; Fernandez *et al.* 2010; Tamošiūnas 2013). These challenges justify the necessity to have tools helping private and public organizations to gain of opportunities resulting in EU and in other economies with prevailing free market rules.

The proposed the stakeholders' management model for complex investments projects is opened to the use of modern IT solutions, decision making support systems including publicly available data sources.

2. Premises for improving the stakeholders' management in complex investments projects

The stakeholders' management in complex investments projects is rather challenging task whereas the latter affect all the counterparties involved. Under current practice of the stakeholders' management in complex investments projects the decisions are in the essence made basing upon the experience gathered and information available (the latter is also often fragmentary). Respectively there can be the shortcomings, ie., as following: counterparties are selected of finite list of candidates; and assessment using incomplete data sources do not provide reasonable basis for objective quantitative comparison of the potential stakeholders. Traditionally enterprises, upon the completion of the cooperation agreements, reassess the eligibility of counterparties using a few indicators of business activities of the past without any complex and thorough assessment of activities in proactive context (Andersen 2016; Clerck, Demeulemeester 2016).

There are several reasons not contributing to the rationality of stakeholders' management. Firstly, it is limitation of information available. Secondly, objectivity of the stakeholders' management in complex investments projects can be achieved using criteria of divergent content thus search for the solution transform into multiple criteria task. For instance, there (Behzadian *et al.* 2010) can be even 26 various criteria used when managing a counterparty. Other authors concerned propose to use not only the short or long lists of quantitative criteria but also the qualitative ones (Hurson, Siskos 2014; Gudauskas *et al.* 2015). This circumstance sophisticates the solution of the task in methodical sense. The specific software, application or at least a special algorithm created based on Excel, Numbers other any other similar alike IT program can be inevitably needed as well as additional human resources when solving the task.

There are many foreign scientists proposing to use the statistic models and the analysis of causal links for the stakeholders' management. The latter also pay attention to the mathematical programming and the set of indeterminate theories as expertise systems as well as other sophisticated methodical tools (Macharis *et al.* 2004; Kodikara *et al.* 2010; Hsu *et al.* 2016; Yang *et al.* 2016. Other authors propose to use the following criteria for the stakeholders' management in complex investments projects: financial stability, interactions among counterparties, quality, managerial, technical and technological potential, and data respectively needed for assessment of counterparties (Kanapeckienė *et al.* 2011; Syverson 2011; Tamošiūnas 2014).

Ideas, arguments to use newer analytic instruments for the stakeholders' management are mainly based on modern IT and related support systems for decision makers. In this regard there is intended to create synergy when using systematic innovations. There has to be noted that the progress in this area have resulted in possibilities to use not only principles, models tested in practice but also the prototypes of the system.

3. The stakeholders' management model for complex investments projects

The stakeholders' management in complex investments projects as sophisticated multiuniform process consists of a few specific tasks. In order to select the counterparties reasonably the candidates have to be known, respective data on their accesibility and eligibility to become a counterparty has to be assessed as well. Moreover, negotiations shall be useful whereas the latter let to improve conditions proposed by potential counterparties. Finally, signing the cooperation contract.

Many of scientific sources are focused on the autonomous use of various phases of the stakeholders' management for complex investments projects. There were only a few sources identified where the management process is considered as the complex system of respective tasks (Brito *et al.* 2010; Šliogerienė *et al.* 2012). Author emphasizes the following three steps of the stakeholders' management process: searching the counterparties, negotiations and signing the cooperation contract. Basing upon the systemic analysis of the stakeholders' management process for complex investments projects it can be clearly concluded that this is not enough. Hence, there have to be the stage for the counterparty' qualification assessment. On the contrary, management process needs to be constantly analyzed for effective functioning. The latter can be reached when monitoring counterparties activities as well as the interactions among them. Having in mind such context there can be justified to consider the complex of tasks incorporated into one integrative model (Fig. 1). Consequently the latter could (basing upon thorough and complex assessment and sythesis) ensure the rational the stakeholders' management for complex investments projects.
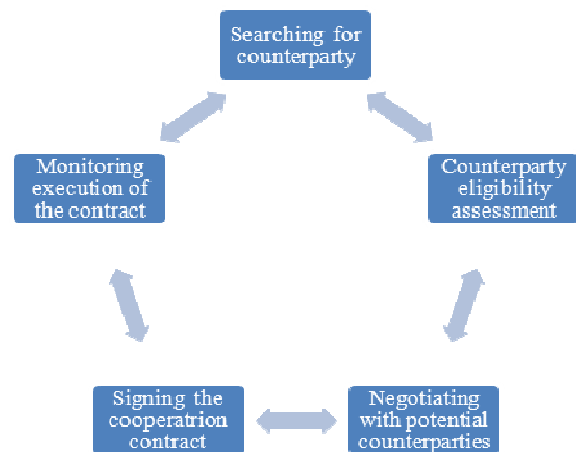

Fig. 1. The stakeholders' management model for complex investments projects (source: prepared by author)

Taking into account the specifics and level of dynamics nowadays of business and its environment, the composition of the model proposed has to be based on the set of specific phases where each of such phases is aimed at solving particular task. The outlook of such design is reasoned by two aspects. Firstly, it creates grounds to improve the tools used per every phase individually per re-

spective tasks. Secondly, it contributes to flexibility of application of the model proposed in a dynamic business environment. For instance, it is important when adapting the latter to various practical circumstances, which depend not only on the decisions of project counterparties but also upon variety of external factors and their combinations affecting the content of project and the process of its implementation.

In this context the most critical tasks of the proposed model are analyzed in detail in the succeeding chapters of this article.

4. Finding counterparties

Finding project counterparties is likely the least analyzed phase of the stakeholders' management model for complex investments projects as per literature reviewed. This can be explained by challenges to formalize this phase however the latter is important whereas it serves in essence as the base for further assessment.

There are two essentials tasks when preparing for search of project counterparties – to specify the cooperation targets and their characteristics to be searched, and data sources.

Evidently, potential candidates for project counterparties can be public or private entities with vast variety of characteristics, eg.: legal form, type and specifics of activity, geography, scope and scale of activity and etc.

For the rationality of searching, a cooperation target is considered as searching feature. A product (a good or service or their combination) can be a cooperation target in the highest aggregation level. Technologically a search operation shall be made per each cooperation target and it is not the subject to the highest aggregation level.

The specification of cooperation target as the searching feature depends on the nature of the cooperation target thus its specification can be subjective and relative to the experience available when rationalizing the specification.

Data on project counterparties can be received from a wide spectrum of diverse sources. Therefore, with respect to rationality of the process it is reasonable to target the expedient data sources.

There were found no any specific recommendations in respective literature for selection of data sources for finding potential candidates for project counterparties. Nevertheless the use of the traditional approach basing on analogies or well-known success stories, as well as relying on other good business practices can be reasonable when searching for the proper data source. In this respect con-

sequently the possible data sources for finding the potential candidates for project counterparties were aligned according to their relevance using the least cost approach.

Considering data sources the secondary information is regarded as a priority. Respectively due to the higher costs internal data sources have to be used before the external one.

The range of external data sources is broad. The data sources may have the prioritized sequence for searching, yet due to the high level of uncertainty such sequence can be hard to justify quantitatively. In this respect it is prudent to use the practical experience. With regard to the author's experience the following sequence for searching the potential candidates for project counterparties using the secondary data sources is proposed:

1) commercial proposals from public and private entities;
2) advertisements of public and private entities and other related economic structures;
3) commercial data sources available to public including business centers (data bases);
4) annual reports of from public and private entities;
5) data from state statistics units of relevant countries (at state, federal and municipal levels as if needed);
6) respective data sources from international institutions (ie.: the World Bank, OECD, United Nations, International Monetary Fund, EUROSTAT);
7) special and scientific literature.

Primary data is collected executing the targeted search. Collecting data in the considered manner as well as using the external sources are costly thus the expediency of every search has to be justified in terms of potential for the respective economic benefit. Respectively hereby at least the method of independent expertise has to be applied.

5. Assessing candidates

5.1. Preliminary selection

The objective of a preliminary selection is to select the potential candidates for project counterparties from all relevant public and private entities using the respective data collected.

The complexity of this task as well as, namely, the number of alternatives of the decision, is explained by a great diversity of cooperation targets. The latter can range from a simple indiscrete good or service to sophisticated complex products (consisting of a range of components) and supple-

mented with related after sales services and goods. This variety stipulates a vast spectrum of characteristics that are needed for the description of a cooperation target in terms of both scope and scale.

Consequently, on the one hand, it can be sufficient to have just one particular characteristic in order to define a specific cooperation target in terms of relevant needs and requirements per consumer. On the other hand, hundreds or thousands of characteristics of most divergent content can be required. In this respect, there can be diverse requirements even with regard to particular characteristics in terms of a precision of their description, ie.: in some circumstances a product with particular characteristics can be needed, in other situation – a range of specific characteristics is acceptable, while in other circumstances – any product of a particular model (or type or class) will be a satisfactory choice.

Practical analysis results in the following conventional cases in terms of description of cooperation target's characteristics:

1) precisely unequivocally defined characteristic based on quantitative indicator;
2) quantitative characteristic determined by a specific range consisting of the following possible partial cases:
   a) with the least possible value of parameter (v_{min});
   b) with the maximum possible value of parameter (v_{max});
   c) with minimum and maximum possible values of parameter (v_{min}, v_{max});
3) aggregated characteristics defined in a generalized manner with the following possible three conventional cases:
   a) the unequivocally stated object title, for instance, glass, pipe, wire, computer, banker and etc.;
   b) the title, type or class of the object in question, for instance, urban engineering, private consulting, apple juice, season's vegetables, portable computer, public investments program and etc.;
   c) title and supplementary qualitative and quantitative characteristics of the cooperation target in question, for instance, knowledge of at least three foreign languages, turnover of no less than one million euro, money transfer in 24 hours, software updates at least twice per annum and etc.

Diversity of possible definitions of cooperation targets stated above and their specifics are pivotal to the selection of stakeholders. In this con-

text the selection process can be specified as consisting of the following tasks:

1) according to the identification code of the cooperation target that is indicated in the query, corresponding targets (good, services, combination of both) are searched through and selected from the databases (one or several can be used) and (or) public data sources and similar alike ones;
2) the selected cooperation targets are examined in terms of level of their complexity and respectively divided into the following groups: indiscrete and complex ones;
3) the match of the selected cooperation targets to the characteristics indicated in the inquiry is examined.

In a formalized way the checking procedures of the characteristics depending on their descriptions are written as following:

1) characteristics can be described by following unequivocal quantitative indicator:

$$v^d = v^q, \qquad (1)$$

where v – value of the target's characteristic, d – database attribute, q – inquiry attribute;

2) characteristics that are inquired by the least margin of the range:

$$v^d \geq v^q_{min}; \qquad (2)$$

3) characteristics that are inquired by the maximum margin of the range:

$$v^d \leq v^q_{max}; \qquad (3)$$

4) characteristics that are inquired by the selected minimum and maximum values:

$$v^q_{min} \leq v^d \leq v^q_{max}. \qquad (4)$$

There has to be noted that practically certain situations are possible when there is not a single target in compliance with all the requirements for the cooperation targets found in the databases or any other relevant similar alike data sources. In such cases two essentially divergent solutions are possible, namely:

1) to update the datasource(s) with the definitions of new targets using the primary data sources;
2) to select the targets from the datasource(s) with the characteristics similar to the requirements of the inquiry.

In case of the latter one, it is expedient to assess the compliance of characteristics of the targets described in the database(s) with the requirements

given in the inquiry. For the execution of this task, it is proposed to use cooperation-target-homogeneity function as the assessment criterion. The value of the homogeneity function for each cooperation target is formalized as following:

$$H_j = \sum_{i=1}^{m} h_{ji} \cdot s_i, \qquad (5)$$

where H_j – integrated value of the target's homogeneity; h – target's homogeneity in terms of particular characteristic; s – significance of the target's characteristic in terms of customer; j – target's index ($j = 1, 2, 3, …, n$); i – index of target's characteristic ($i = 1, 2, 3, …, m$).

Respectively a homogeneity of the target according to the i characteristic ($i = 1, 2, 3, …, m$) is set as a ratio of characteristics' values describing particular feature of the target and respective requirements assigned in the inquiry:

$$h_{ji} = 1 - \left(\frac{\left(v_i^d - v_i^q\right)}{v_i^q} \right), \qquad (6)$$

where v – value of the target's characteristic, d – database attribute, q – inquiry attribute, i – index of target's characteristic [$\bar{B}_j$, B_j^*].

In order to ensure a greater reliability of the analysis (eg., in terms as of scope as of scale) it is expedient to separate namely those cooperation targets which have a value of homogeneity function within the range [$\bar{H}_j$, H_j^*],

$$\text{here } \bar{H}_j = \sum_{j=1}^{n} H_j / n; \qquad (7)$$

$$H_j^* = \max \{H_1, H_2, ..., H_n\}. \qquad (8)$$

In accordance with the proposed technology of the stakeholders' preliminary selection the focus is towards organizing data on cooperation targets and possible stakeholders in terms of the integrated database(s) (as publicly accessible or internal ones at organization level). The content of such database should consist of three data item (project stakeholder, cooperation target, constituent of cooperation target), with relevant reciprocal data flow among them and an option to describe every data item by n characteristics. Each stakeholder could set up their number (n value) taking into account the specifics of its business. Considering a possible variety of characteristics of stakeholders and cooperation targets, the description of a characteristic should consist of two parts, namely: an attribute and content. The description pattern per each is defined basing upon the assessment of inherent business practice of distribution of values per relevant characteristics.

5.2. Complex assessment

Science can provide valuable theories, concepts, ideas and solutions (Macharis *et al.* 2004; Zavadskas *et al.* 2008; Behzadian *et al.* 2010; Šliogerienė *et al.* 2012; Corrente *et al.* 2014; Hashemkhani Zolfani *et al.* 2014; Scholten *et al.* 2015; Susnienė, Purvinis 2015) on how to utilize various quantitative and qualitative methods of decision making for the assessment of stakeholders. Inherently, methods have their pros and cons. Nevertheless it is necessary to emphasize two key barriers when explaining reasons why these solutions in question are not widely used in practice:

- most of works are not yet reaching the relevant level of practical application;
- the specific and sophisticated software as well as respectively highly qualified specialists are needed whereas complex methods are applied.

Most of researchers in question emphasize the need to consider a broad spectrum of dynamic and complex conditions when assessing possible stakeholders. Due to this circumstance the stakeholder assessment task is ranked to the class of the multiple criteria. Consequently when forming the decision model of this task it is imperative to find the answers the following key questions: what set of criteria and what rules of their application can secure a needed level of justification of assessment and objectivity?

With respect to the case in question the decision on the criteria system can be reasoned using the following key factors:

1) the need for a comprehensive assessment;
2) diversity of cooperation targets;
3) diversity of potential stakeholders;
4) diversity of priorities (and their combinations) of the stakeholders having the right to decide;
5) the need of comparison of alternatives of potential project stakeholders.

During the last 30 years the application of multiple criteria assessments have been intensified and used in broader and more diverse context. The classification of such models can be based on various indicators. With regard to the case in question the group of the ranking models distinguished by the purpose attribute is of particular interest. When considering models subject to the group concerned,

the assessments are based on the preference structures (while also acknowledging the possible discrepancy in the content per criterion). Respectively the design of such structures is based on preference ratio (Macharis *et al.* 2004; Hashemkhani Zolfani *et al.* 2014). Summarizing, the purpose of the use of such models is to align the items of the set $G = \{g_1, g_2, ..., g_n\}$ according to the superiority. The set of criteria expressing the preference ratio is the essential component for the ranking models. The principle of ranking is based on a pair-wise comparison of all the alternatives (Offenbeek, Vos 2016). For the assessment of the interactions of alternatives a preference function is applied. The latter expresses at what ratio a particular alternative is superior to another in terms of respective criteria:

$$F_e(g_i, g_j) = F_e[f_e(g_i) - f_e(g_j)] =$$
$$F_e\left[\Delta f_e(g_i, g_j)\right], \forall i, j, e,$$
$$0 \le F_e(g_i, g_j) \le 1, \qquad (9)$$

where F, f – indications of function; g – alternatives; Δ – deviation; i, j – indexes of alternatives of potential project stakeholders; e – index of an assessment criteria.

Modifications of this principle are applied in various areas of science and economy sectors. There has to be noted as well that the latter principle is used in various multiple criteria systems (ie.: PROMETHEE, ELECTRE) (Macharis *et al.* 2004; Behzadian *et al.* 2010; Brito *et al.* 2010; Šlioge-rienė *et al.* 2012).

Hence in such context considering the assessment of potential project counterparties as a multiple criteria ranking task of alternatives, for the complex assessment of alternatives the integrated criterion (W) is proposed. The latter can be described as following:

$$W = f(w_1, w_2, w_3..., w_m), \qquad (10)$$

where w_i – partial criteria.

Respectively every partial criterion w_i belongs to the lower stage which means the latter is subject to a function of primary criteria, namely:

$$w_i = f(w_{i1}, w_{i2}, ..., w_{in}), \qquad (11)$$

Functions as of integrated criterion as of partial criterion are specified when setting up the parameter of significance per every criterion. Consequently the function of integrated criterion can be considered as following:

$$W = \sum_{i=1}^{m} w_i \, s_i, \qquad (12)$$

where s – significance of partial criterion; i – index of partial criterion and respectively a function of a partial criterion, namely:

$$w_i = \sum_{j=1}^{n} w_{ij} \cdot s_{ij}, \qquad (13)$$

where j – index of primary criterion.

Basing upon the analysis of various methodical sources as well as empirical investigations in the concerned area of research the tentative primary criteria have been determined (Table 1).

Table 1. Tentative primary criteria
(Source: prepared by author)

Partial criterion	Primary criterion
Counterparty financial sustainability	Revenues preservation (net profitability, return on assets, return on equity
	Financial leverage (the golden balance rule, the net working capital, the current liquidity ratio, mobility, the asset turnover)
	Effectiveness of execution of contracts
Counterparty productivity	Labour productivity
	Required level of scope and scale for sales
	Velocity of resources
	Efficiency of resources
	Return on materials used for production
Quality of product (goods, services, their combination)	Conformity of product parameters to obligatory standards and norms
	Competitiveness of qualitative parameters of product
	Competitiveness of product development, production and sales cost parameters
	Level of innovation
	Marketing efficiency
Price	Maintenance costs
	Margin requirements
	Frequency of sales
	Reliability of payment system
	Speed of payment
	Unit price
Delivery efficiency	Speed of delivery
	Reliability of delivery
	Delivery costs per unit
After-sales service	Maintenance costs
	Guarantee period and extension program
	Expedition of service

The content of every partial criterion is rather complex, and therefore the latter can be specified more accurately only via primary criteria. With regard to the primary criteria (unlike to partial criteria) there can be assumed that the overall list of the primary criteria is not expedient due to a diversity of potential stakeholders and cooperation targets as well as the specifics of environment (as per each stakeholders and the cooperation target). Although the latter could be concretized and classified into respective types in terms of specifics of stakeholder and cooperation target Nonetheless, it can be reasonable to have even a tentative set of primary criteria per every partial criterion proposed (Table 1).

6. Conclusions

In the context of international and global integration of economies with their diversity of development the sophisticated business networks are inevitably created. Consequently rational cooperation on daily basis when working on concrete investment programs, projects or other development activities become pivotal to the competitiveness of business networks. Cooperation synergy becomes one of most critical factor determining possibilities of business entity to act rationally locally and globally. Under these circumstances it becomes expedient to increase justification of decisions subject to management of counterparties when implementing complex investments projects.

The proposed model consisting of five integrative phases (search for counterparties, assessing candidates, negotiations with potential counterparties, signing cooperation contracts, monitoring their execution) cover the overall cycle of counterparties management process for complex investments project. Interactions among the phases as well as solutions per every task of the model are based on integrated data base or alternative data source of possible as well as actual project counterparties and cooperation targets.

In terms of importance and complexity the assessment of counterparties is separated from the rest of the phases of model proposed. In order to reduce expenditures, the assessment of potential counterparties is divided into the following coherent tasks:

- Firstly, it is proposed to use cooperation targets homogeneity function. The universality of application is inherent to the latter, while quantitative assessment respectively reduces subjectivity.

- Secondly, complex assessment of counterparties is regarded as multiple criteria ranking task of possible variants of choice of stakeholders which is solved using three-stage-criteria system. Two parameters of the system concerned are proposed to be controllable – set of primary criteria and significance of primary and partial criteria add flexibility to the system when adapting the latter under various and dynamic business conditions while quantitative assessment ensure objectivity of decisions to be made.

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