

**Project Selection Regarding Life-Cycle Oriented and Equity-Intensive Projects:
A Critical Assessment of the PPP Project Selection Process
in the Construction Industry**

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ABSTRACT

At first glance, project selection decision-making in construction companies dealing with life-cycle oriented and equity-intensive projects is dominated by intuition rather than structured quantitative processes. In contrast, companies from other business fields (e. g. institutional investors) that are also dealing with these projects are successfully using quantitative instruments to support their project selection processes.

The objectives of this paper are to analyze if the assumption that intuition guides project selection processes in construction companies can be justified, and to investigate how this process can be enhanced. To meet these objectives, three main aspects are discussed. First, the state of practice in the construction industry is outlined by showing a practical example of a project selection process that is currently being applied by an international construction company. Second, the practically applied project selection process is assessed critically and improvement potentials are outlined. Finally, the concept of a quantitative project selection model for life-cycle oriented projects in the construction industry is presented.

This paper represents one of the first steps of a research project that aims to develop a quantitative project selection model, which will enable construction companies to select projects suitable to their specific profile.

INTRODUCTION

Project selection processes are generally predetermined by the superordinate strategy of an enterprise. This enterprise strategy defines, for example, business areas of interest for the company, key markets and competitive strategies (Girmscheid 2010a). Nevertheless, every specific business unit (BU) has to decide or at least suggest, which specific projects they would like to apply for. Consequently, the

enterprise as a whole or the particular BU's themselves have to define a project selection process, which supports them in identifying the most suitable projects.

Defining an appropriate project selection process is crucial for the success of every BU, and for the success of a construction company as a whole (Girmscheid 2010c). Nevertheless, it is most important for BU's dealing with life-cycle oriented and equity-intensive projects e. g. Public Private Partnership (PPP) projects. PPP's represent the most established type of life-cycle oriented and equity-intensive projects and have therefore been focused on within this paper. PPP projects as well as life-cycle oriented and equity-intensive projects in general are characterized by enormous bid costs, high equity investments and long contract durations (Weissenböck und Girmscheid 2013).

To get a better understanding about the project selection processes in regard to life-cycle oriented and equity-intensive projects and specifically PPP, this paper analyzes the state of practice by using a practical insight out of the construction industry. Subsequently, the analyzed PPP project selection process is assessed critically and potentials for improvement are outlined. Finally, the concept of a quantitative project selection model for PPP projects in the construction industry will be introduced briefly.

STATE OF PRACTICE – PPP PROJECT SELECTION IN THE CONSTRUCTION INDUSTRY

The actual project selection process in the construction industry was investigated by reviewing the current process of a large, international construction company that is successfully completing PPP projects in various countries and fields (e. g. social infrastructure, highways, tunnels). Due to confidentiality reasons the company cannot be named, nor can the underlying publications be cited.

The examined PPP project selection process is divided into two phases (Figure 1). Phase 1 deals with the selection of potential target countries/target markets. Phase 2 deals with the selection of specific projects within the identified target countries/target markets.

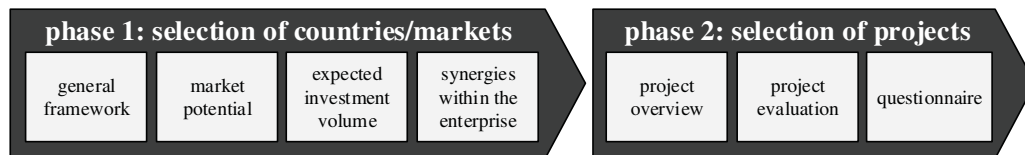


Figure 1. Project selection in the construction industry – State of practice.

Phase 1: Selection of target countries/target markets

In this phase, potential target countries and potential target markets are analyzed. Due to the fact that the analysis of every target country/target market involves time, effort and costs, a pre-selection based on the enterprise strategy as well as on subjective evaluations of the responsible decision-makers has been conducted. After this pre-selection, a certain number of potential target countries or potential target markets are analyzed in further detail.

The criteria used for analyzing the target countries/markets can be divided into two main groups:

- 1) the general framework (economic/legal/social) within the country/market and
- 2) the specific market potential.

In addition to these two groups, a qualitative evaluation regarding the expected investment volume (short-, medium- and long-term) is conducted and the potentials of possible synergies within the enterprise are estimated (Figure 1).

- General framework (economic/legal/social)

Within the group of the general framework regarding the economic, legal, and social environment, the criteria listed below are evaluated:

- budget balance (*),
- GDP (*),
- demographic development (*),
- legal framework,
- financial market (*),
- country rating (*),
- potential partners and
- cultural fit.

The criteria marked with an asterisk (*) represent “hard facts”. For these “hard” criteria, key figures, ratings or grades are available and can be used within the evaluation process. Although quantitative data are available, every criteria has been translated into a qualitative ranking scale (grades 0 to 5) (Table 2).

The unmarked criteria represent “soft” criteria. These criteria have been evaluated by using the questionnaire and rating system shown in Table 1.

Table 1. Description of “soft” criteria regarding the general framework.

| general framework: description of "soft" criteria | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| legal framework | Do PPP laws exist that disburden PPP processes? (0 = no laws; 5 = laws exist and they proved as practical) |
| potential partners | What are the chances to find potential construction and joint venture partners? (0 = very poor; 5 = very good) |
| cultural fit | How is the work and social environment compared to the domestic market? (0 = very different; 5 = similar to the domestic market) |

Evaluating every “hard” and “soft” criterion out of this group for every single potential target country or target market leads to results as shown, for instance, in the example in Table 2. “Soft” criteria are highlighted by using the grey background color.

Table 2. Example for the evaluation of the general framework.

| Criterion | | Country 1 | Country 2 | Country 3 | Country 4 | Country 5 | Country 6 | Country 7 | Country 8 | Country 9 | Country 10 |
|--------------------------------------------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| general framework (economic / legal / social) | budget balance | 3 | 1 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 |
| | GDP | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 3 | 2 | 3 |
| | demographic development | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 2 | 3 |
| | legal framework | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 |
| | financial market | 2 | 3 | 1 | 2 | 1 | 4 | 2 | 4 | 3 | 4 |
| | country rating | 2 | 3 | 1 | 2 | 1 | 4 | 2 | 4 | 3 | 3 |
| | potential partners | 5 | 5 | 3 | 2 | 2 | 3 | 2 | 3 | 4 | 2 |
| | cultural fit | 3 | 2 | 1 | 3 | 1 | 3 | 3 | 4 | 3 | 2 |

- Market potential

The market potential is analyzed considering the fact that entering a new country/market is commonly associated with considerable costs. These costs have to be justified by a corresponding volume of projects in potential target countries/markets. Girmscheid (2010a) estimates that the costs caused by a strategy that aims for the development of a new market are four times higher than the costs caused by a strategy that aims for a higher penetration of existing markets.

Within the market potential group, the criteria listed below are evaluated:

- former market volume,
- expected project pipeline (short- to medium-term),
- potential for further projects (medium- to long-term),
- competition,
- profit opportunities,
- market entry barriers and
- size of expected projects.

All criteria within the market potential group have been treated as “soft” criteria, i. e. without evaluating quantitative data. As a consequence, the evaluation of all criteria within the market potential group has been conducted by using the questionnaire and rating system shown in Table 3.

Table 3. Description of “soft” criteria regarding the market potential.

| market potential: description of "soft" criteria | |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| former market volume | How good is the PPP experience in the country (number of projects)? (0 = not any; 5 = many) |
| expected project pipeline (short- to medium-term) | How many projects can be expected short- to medium-term? (0 = not any; 5 =many) |
| potential for further projects (medium- to long-term) | Is there further medium- to long-term potential for PPP projects apart from the expected pipeline? (0 = no, not at all; 5 = yes, there is great potential for further PPP projects) |
| competition | How strong is competition in the market? (0 = very high - little chances to win a project; 5 = no competition at all) |
| profit opportunities | What are the chances to achieve returns in this market? (0 = very poor chances of achieving returns; 5 = very good chances of achieving returns) |
| market entry barriers | How strong are market entry barriers? (0 = very high, no chances to enter the market; 5 = no barriers, easy to enter the market) |
| size of expected projects | What's the expected size (investment volume) of the expected projects? (0 = too small for our company; 5 = perfect for our company) |

Evaluating every criterion within this group for every single potential target country or target market leads for instance to results such as those shown in the example in Table 4.

Table 4. Example for the evaluation of the market potential.

| Criterion | | Country 1 | Country 2 | Country 3 | Country 4 | Country 5 | Country 6 | Country 7 | Country 8 | Country 9 | Country 10 |
|-------------------------|----------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| market potential | former market volume | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 2 |
| | expected project pipeline (short- to medium-term) | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 2 | 2 |
| | potential for further projects (medium- to long-term) | 4 | 1 | 2 | 2 | 2 | 2 | 5 | 4 | 2 | 3 |
| | competition | 3 | 2 | 4 | 4 | 4 | 2 | 3 | 2 | 3 | 3 |
| | profit opportunities | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 4 | 3 |
| | market entry barriers | 2 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 |
| | size of expected projects | 2 | 3 | 2 | 2 | 2 | 4 | 3 | 4 | 4 | 2 |

- Expected investment volume (short-, medium- and long-term)

The results of evaluating the general framework (axis of abscissae) and the market potential (axis of ordinates) are graphically displayed in Figure 2. Furthermore, a third dimension is displayed for every target country/target market, which is represented by the size of the respective bubble.

This third dimension represents the expected future PPP investment volume (short-, medium- and long-term) and is calculated by summing up the evaluation of two criteria from the market potential group: (1) the expected project pipeline (short- to medium-term) and (2) the potential for further projects (medium- to long-term).

- Synergies within the enterprise

In addition to the criteria mentioned above, the analyzed construction company evaluates if synergies within the enterprise can be utilized by starting a PPP project in a target country/target market. Life-cycle oriented projects as PPP projects are particularly suited to utilize synergy potentials within the enterprise and offer opportunities to extend the value chain (Girmscheid 2010b). Both the utilization of synergy potentials and the extension of the value chain represent core elements of the corporate strategy in big construction enterprises (Bilfinger SE 2014, HOCHTIEF Aktiengesellschaft 2014, STRABAG SE 2012) and consequently, are screened before selecting new PPP projects.

The criterion of synergies within the company, therefore rather represents an exclusion criterion than an evaluation criterion.

- Results of phase 1: Selection of target countries or target markets

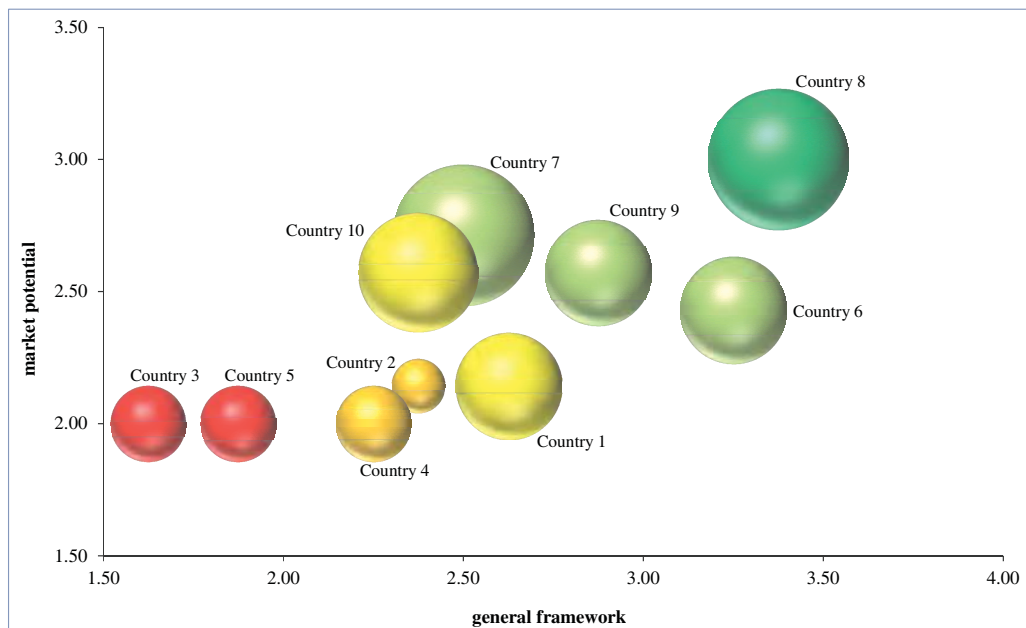


Figure 2. Valuation results regarding the selection of target countries and target markets.

Figure 2 illustrates the results of the evaluation process. The values on the axis of abscissae represent the arithmetic mean of the equally weighted criteria of the general framework. The values on the axis of ordinates represent the arithmetic mean of the equally weighted criteria of the market potential. The size of the bubbles represents the expected PPP investment volume. The evaluation of synergies within the enterprise is not displayed in Figure 2 due to the reason mentioned above (no evaluation criterion).

Phase 2: Selection of specific PPP projects

After completing the selection of potential target countries and target markets, the evaluation and selection of particular PPP projects in the identified target countries/target markets is conducted. The objective of this step is to arrive at a "shortlist" of PPP projects, for which the tendering process should be started.

In order to standardize the evaluation process for all departments and disciplines dealing with PPP projects, a form sheet was developed which has to be completed for every potential PPP project. This form sheet is transmitted to the responsible decision-makers, who decide whether or not to commence with a respective PPP project and the necessary support processes (forming a consortia, etc.).

The standardized form for evaluating potential PPP projects consists of the following three parts:

- 1) a project summary,
- 2) an actual project evaluation and
- 3) a questionnaire.

The three areas of concern are examined subsequently in a few sentences.

- Project summary

The purpose of the project summary is, as the name indicates, giving the responsible decision-makers a brief overview of the key facts of a PPP project.

The project summary of the investigated enterprise contains the following aspects: name of the particular PPP project, country and location, the responsible BU within the company, the type of project including a rough specification (e. g. "highway, traffic volume risk, brown-field" or "highway, availability payments, green-field"), the estimated capital expenditure, the estimated volume of the construction activities, the estimated volume of the operating and maintenance services, the estimated equity requirements, the targeted share of the equity, the expected duration of the contract, the expected date of commencement of construction and the expected date of completion.

- Project evaluation

The respective PPP project is evaluated solely on a qualitative basis. The evaluation includes specifications on the following aspects: advantages of the PPP project, disadvantages of the PPP project, opportunities arising from the PPP project, threats arising from the PPP project, already known obstacles that could lead to a withdrawal from the tender process as well as the next steps planned within the project.

The first four aspects mentioned are, in particular, very general and leave much room for interpretation.

- Questionnaire

The third and last part of phase 2 (selection of specific PPP projects) consists of a predetermined list of questions. All questions are closed questions and the respective answers can be justified by brief comments. The questions are divided into five areas of concern. These are: (1) the legal framework, (2) the project environment, (3) the profitability of the PPP project, (4) the bankability of the PPP project sustainability and (5) the suitability with the corporate strategy.

As one can imagine, many questions asked here deal with facts that have already been evaluated in phase 1, the selection of potential target countries/target markets.

The actual decision process is executed by the responsible decision-makers. Their decision is based on and justified through the described evaluations and forms of phase 1 and 2 (see above).

CRITICAL ASSESSMENT OF THE PPP PROJECT SELECTION PROCESS

The PPP project selection process that is currently applied in practice in the construction industry shows many commonalities with the project selection process suggested by Girmscheid (2010c) for ordinary construction projects. A further development of the project selection process, which considers the extended remit of PPP projects, is currently hardly taken into consideration. Construction companies emphasize that a more substantiated PPP project selection process is difficult to apply due to a small level of knowledge about a specific project at call for tender stage. This argument is definitely valid. Nevertheless, the current project selection process gives room for improvement. The following three aspects, in particular, are criticized:

- 1) Quantitative and proven data has been transferred into a qualitative ranking scale.
- 2) All criteria have been equally weighted. It should be distinguished between more and less important criteria.
- 3) Many criteria have been evaluated twice. Once by evaluating potential target countries/target markets, once within the questionnaire. A structured project selection process should evaluate all important criteria just once.

Comparing the current PPP project selection process of the construction industry with the processes that are applied in comparable business areas indicates important further enhancement potentials: the consideration of both the current project portfolio and diversification effects.

Institutional investors, for instance, make use of equity investments in PPP projects due to their positive diversification effects on the portfolio as a whole and their low correlation to other investments (Peng and Newell 2007; Weber and Alfen 2010). These investors are selecting new equity investments by considering the effects, which a new project might have on the current portfolio and successfully

apply quantitative instruments as Modern Portfolio Theory (MPT). Recent publications show that even a portfolio consisting solely out of infrastructure projects in various regions and sectors offers great potential for diversification and risk minimization (Bahçeci and Weisdorf 2014). Obviously, there is a certain potential of diversification that could be utilized by construction companies dealing with life-cycle oriented and equity-intensive projects as well.

The real estate business takes portfolio considerations into account as well. Wellner (2011) verified that MPT can be applied for real estate investment decisions. These investments are highly comparable to PPP project investments. Viezer (2010) goes even further and supposes that private equity investors (e. g. construction companies dealing with PPP projects) “...may someday find MPT as a useful engine of inquiry” (p. 753).

These recent findings encouraged the authors of this paper to investigate the potential of MPT in regard to PPP project selection. Consequently, a research project has been launched to develop a new PPP project selection model (PPP-PS-model).

CONCEPTION OF THE PPP-PS-MODEL

Considering the aspects that have been criticized most after investigating the current PPP project selection process, the new PPP-PS-model has to reflect the following aspects:

- the new model has to be developed on a quantitative basis,
- the criteria have to be weighed according to their importance,
- all criteria should occur just once,
- the problem of limited knowledge about PPP projects at call for tender stage has to be taken into account and
- the current PPP project portfolio as well as diversification effects have to be considered.

Based on these objectives, the authors started developing a new PPP-PS-model. The basic conception of this model has been introduced by Weissenböck and Girmscheid (2013) and is displayed in Figure 3.

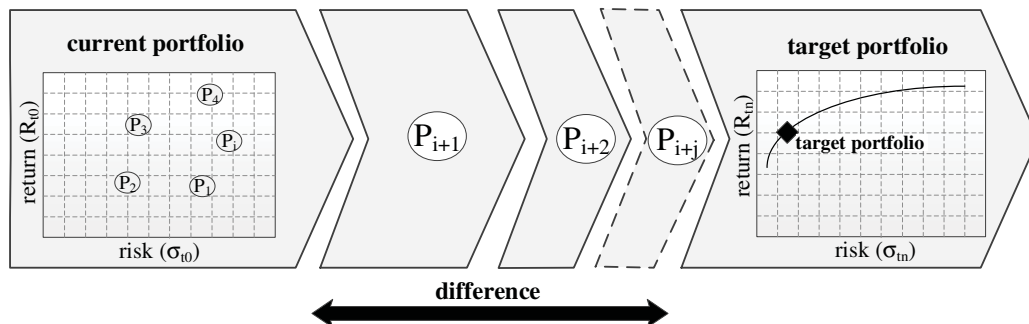


Figure 3. Conception of the PPP-PS-model (after Weissenböck and Girmscheid 2013).

As demonstrated in Figure 3, the new PPP-PS-model involves three modules:

- 1) the analysis of the current portfolio,
- 2) the evaluation of the target portfolio and
- 3) the determination of an optimal new project.

Additional information regarding the conception of the model has been presented by Weissenböck and Girmscheid (2013).

CONCLUSION

This paper focused on the investigation of the current project selection process in the construction industry regarding life-cycle oriented and equity-intensive projects e. g. PPP projects. Thankfully, the authors got access to various documents of a construction company that is successfully dealing with PPP projects in various countries and fields (e. g. social infrastructure, highways, tunnels).

The investigations confirmed that project selection decision-making in construction companies dealing with life-cycle oriented and equity-intensive projects is dominated by intuition rather than structured quantitative processes. Qualitative rankings have predominantly been used, all criteria have been equally weighted and many criteria have been evaluated twice. Hence, there is room for improvement in the PPP project selection process of construction companies.

In addition, the comparison with other business areas showed that quantitative instruments such as MPT are commonly used and that diversification effects as well as the current portfolio are considered regularly.

Therefore, the authors initiated a research project, which aims to develop a new quantitative project selection model. Applying this model will enable construction companies to select projects suitable to their specific profile and will support them in minimizing their risks. Consequently, this might lead to an increasing number of both successful life-cycle oriented projects and successful construction companies within this field. Both offers the potential of an increasing economic sustainability of construction companies.

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