



Pertti Lahdenperä

## Project alliance

| The competitive single  
| target-cost approach



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## Abstract

This publication reports on the development work focusing on the procedures of a procurement method for a construction project that integrates early, competitive implementer selection and sharing of risks between the parties. An approach where the key parties bear the risk jointly and service providers are rewarded based on the success of the overall project, encourages the actors to consider each other's views and to cooperate effectively. The integration of know-how creates a basis for innovation and excellent performance – especially in the case of projects that involve a great deal of uncertainty.

The procurement (or project delivery) method in question is project alliance where competitive selection is integrated with collaborative and early selection of service providers from the viewpoint of design in a novel way. The publication describes an operational model where selection takes place through elimination of candidates and a subsequent two-phase tendering process: the qualitative tender precedes the workshops that are part of evaluation, followed by submission of tender price data. The price is made up of unit prices and overhead rates while price and scope assessments common to all competitors are used selectively for comparison calculations.

In the developed operational model selected service providers, designers and builders, develop the project and its designs in cooperation with the owner before the actual target cost is set. The revised tender price and target cost together with the predetermined allocations of cost overruns and underruns determine the rewards of service providers at different performance levels. The idea is to spur actors to invest especially in the pre-implementation development phase which is also promoted by the project's incentive system. An attempt should also be made to incorporate into the system the impact of the realisation of the key qualitative target areas.

Other issues the publication deals with include the features of project alliance, its potential advantages and drawbacks, assessment of the suitability of alliancing and prerequisites for using it as well as the administrative structure of the organisation formed by the partners. The so-called competitive single target-cost project alliance presented has been developed in close cooperation with a wide expert network of practical actors. Their view is that the project alliance approach produced as a result of the work is a suitable and useful for the implementation of demanding transport infrastructure projects, road and railway projects, which were the primary application.

## Foreword

This publication is the result of the *Alliancing in infrastructure projects* study carried out at VTT aimed at developing procedures and ground rules for a construction project procurement method based on partnership and risk sharing. The initial stimulus for the project came from the favourable feedback from Australia about the performance and suitability of the procurement method especially for transport infrastructure projects. Another stimulus was the interest raised by alliancing in the *Innovation promoting competition* project\* financed by *Tekes*, among others. The development work reported in this publication was launched as part of that project.

The legal praxis concerning competitive tendering in public procurement was found a special challenge which is why it was considered that the implementer selection procedure used elsewhere that is based on competence could not be introduced as such. On the other hand, there was the desire to avoid heavy competition involving design and total pricing. A comparison method applied early on that stresses competence while also considering price, to which an incentive system can be linked, was thus heavily weighted in the work. The end result was a solution that is, as far as is known, novel also internationally, which the name of the publication also intends to portray – *Project alliance, the competitive single target-cost approach*.†

The operational model has been developed in several work groups and workshops, and many practical actors have contributed to it. Thus it can be said that the result represents the joint view of the sector on how project alliance can and should be developed to allow its application in practice. The Road Administration has committed to using the operational model and is presently seeking the first suitable projects to be implemented as project alliances. Through owner organisations the development work has also been linked to the joint Nordic *Gemensam Nordisk Anläggningsmarknad* project that devel-

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\* See Lahdenperä, P. 2007. Innovaatioita edistämässä. Lähtökohtia ja ajatuksia rakennus- ja infra-alan hankintamallien kehittämiseen [Fostering innovation. Views and ideas on the development of building and infrastructure construction procurement]. Espoo, VTT. VTT Working Papers 87. 74 p. (in Finnish)

† There are variations of project alliance. From the service providers' selection standpoint there are the *single target-cost approach* and the *multiple/dual target-cost approach* (Department... 2008a; 2008b; Ross 2006; 2008). In the former, only one consortium is selected through quality-driven comparison, and the project is developed with it towards definition of target cost and project implementation. In the latter approach, again, two competing consortia are generally selected to design the project together with the owner, and the owner selects the implementer only after target costs have been defined which emphasises the significance of price in selection. "A genuine alliance that stresses trust and cooperation" was selected as the starting point of the approach described in this work where, in keeping with the first approach, a single consortium is selected for the development phase. Yet, the competitive elements of selection also involve price factors which results in a sort of competitive alliance, but the tender price does not directly define the project target cost. In practice, the concept of *competitive alliance* has, however, come to refer to the *multiple target-cost approach* (e.g. Davis & Cowan 2008; Greenham 2007) which means that neither competitiveness nor the single target-cost approach alone can define the approach presented here.

ops the project practices of road and rail administrations. The aim is to utilise the model in Finland as well as the other Nordic countries. Naturally, we are dealing with launch-phase views and many practical challenges still must be met. It is also likely that views on the solutions presented in this publication will evolve as experiences are gained.

The project has been financed by traffic infrastructure owners, the Finnish Road Administration and the Finnish Rail Administration, and sector enterprises Destia Oy, Lemminkäinen Infra Oy, Skanska Infra Oy and YIT Construction Oy, as well as the Infra ry association. The contributing consulting companies were Ramboll Finland Oy, Sito Oy and WSP Finland Oy. The following experts participated in the work as representatives appointed by the financiers:

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Research Scientists Tiina Koppinen and Tarja Mäkelä (Ch. 3) and Senior Research Scientist Leena Korkiala-Tanttu (Ch. 6) from VTT participated in charting and development and work groups in addition to the undersigned at various phases as well as produced material for the publication.

Thanks to all those who made the project possible by contributing to it.

Helsinki, March 2009

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# 1. Introduction

*This chapter ponders the need and possibility of developing infrastructure project implementation and how the development work described in this publication and the solutions it produces meet the challenges. Moreover, it sheds light on the procedures of the realised development work and summarises the content and structure of the report.*

## 1.1 Development need

The problems related to traditional investment project procurement methods and the pressure to develop the infra sector are an incentive for seeking new operational models. Traditional procurement methods do not fully utilise the know-how of the various parties while relatively early fixed solutions disallow continuous project development.<sup>1</sup>

The uncertainty related to demanding projects highlights the problems of traditional procurement methods (or project delivery systems). Implementation of projects in the built environment and the resulting many interfaces and interest groups, heavy traffic as well as the demandingness of the arrangements during site work are part of the challenge. As are the uncertainty of conditions and input data and the need to minimise nuisances during construction. Technological development also brings opportunities that are not always known at the launching of a project.

Pricing of that uncertainty may be expensive to the owner when competing with traditional methods where the approach does not always encourage implementation based on the owner's goals. Deviations during construction also tend to increase conflicts of interest in projects. On the other hand, approaches where the owner bears all risks may not goad actors to do their best. Thus, it must be possible to allocate risk between the actors. Risk sharing is a means of increasing cooperation between the parties and making it more effective.

Collaborative production may be considered a key factor in trying to improve sector performance and increase innovation when projects are implemented under demanding conditions. Yet, competitiveness remains the starting point that produces the needed stimulus to pursue an excellent level of performance. That leads, for instance, to the project alliancing process analysed in detail in this publication where:

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<sup>1</sup> This publication does not delve deeper into the problem areas of the other procurement methods underlying the development of project alliance. More detailed information on them can be found e.g. in Scott (2001), Koppinen & Lahdenperä (2004) and Lahdenperä & Koppinen (2004).

- The owner's goals guide implementation on the project level. To be able to reap the benefits from the interfaces between competences, the alliance partners are to be bound to the project as early as possible. Thus price cannot be the key selection criterion, but actors must be chosen with an emphasis on competence and capabilities.
- Selection is also hoped to provide solutions as to procedures and organisation which is often a compromise of the traditional set of roles. Team building is guided by openness and pursuit of common interest. Melding into a team is a challenge in itself; the parties organise workshops for the purpose already as part of the actor selection process.
- Once the consortium has been selected, the project group continues the design work in order that, for instance, the project's target cost can be set and agreed. Lump sum contracts are not used; the parties share risks. This ensures that the interests of the various parties coincide and they seek cooperation.
- The project is carried out in cooperation utilising different types of expertise to continually develop it. As the project proceeds, and especially on its completion, the outcome is evaluated: shares of cost overruns and savings are determined on the basis of cost performance as well as qualitative indicators derived from project goals as agreed in advance.

The basic idea is that an operational model where risk is borne jointly and reward is shared on the basis of the success of the entire project makes the parties consider each other's views better and collaborate more efficiently. Openness and transparency are features of the approach that build confidence. The integration of different kinds of competence creates preconditions for discovering new solutions capable of being introduced immediately. This is especially true in special projects, when trying something new or when the implementation involves more uncertainty than normally.

Practical experience also shows that this model, so-called project alliance, creates the general conditions for achieving great results. Experiences from this procurement method appear to be almost exclusively positive also in construction<sup>2</sup> although the first successful applications seem to have been made in other industries<sup>3</sup>. Australia was the first to apply project alliance in construction on a larger scale – especially in road construction.<sup>4</sup>

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<sup>2</sup> CRC (2004); Walker & Hampson (2003b); Thorpe & Dugdale (2004); Steele (2002); Olds (2002); Skinner and Neale (2003); Evans & Peck (2003); Lin (2005). Project alliance has also been used successfully to salvage failed projects in progress based on traditional contracts (Ross 2003b).

<sup>3</sup> Condensed historical reviews (and references to broader presentations) are found at least in: KPMG (1998); Thomsen (2006); Sakal (2005); Ross (2006); Walker & Hampson (2003a). Repeated references

## 1.2 Development task

The aim of the work described in this publication is to develop the procedures and ground rules of a construction procurement method based on partnership and risk sharing. In practice, that means the so-called project alliance applied to various transport infrastructure projects, mainly road and rail projects. A special target of development in relation to existing material was the development of a competitive operational model.<sup>5</sup>

The general challenge was to 1) understand the possibilities of alliance-type procurement in increasing production efficiency, 2) chart the procedural solutions for project alliances to the extent the approach has been used worldwide, 3) evaluate the feasibility of the application of the procurement method in local Finnish (and European) culture and business and legal environment and, particularly, 4) develop project processes, procedures and ground rules to support the use of the project alliance in said application environment.

Thus, development work focused on process engineering and basic contractual solutions that form a starting point for later preparation of project documentation. The workability of project alliance which stresses cooperation also requires heavy investment in cultural and management issues, which were excluded from the work reported here.<sup>6</sup>

## 1.3 Implementation of development work

The development work built on a literature study and expert workshops. The several expert groups involved focused on different sections of the problem field. The groups consisted of a few dozen experts and practical actors from transport network owner organisations as well as companies offering corresponding design and construction ser-

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were made especially to Knott (1996) and Wandoo (1997), which described the first alliance-type oil drilling projects but were not available at the writing of this publication.

<sup>4</sup> Manley (2002) – international procedural survey; Ross (2006) – summary of Australian projects. Project alliance has been used to some extent also in other countries (e.g. Manchester... 2009).

<sup>5</sup> The applications consist specifically of large public procurements governed by EU Directives (Directive 2004) whose implementation in Finland is governed by the law on transposing said directives (Laki... 2007). Any possible differences have not been addressed, but according to Finnish legal usage evaluation of economic advantageousness requires using a quite definitive total price in the comparison of tenders. Thus the developed approach differs from the applications of so-called pure project alliance presented in the surveyed literature. The procedure makes procurement systematic which is beneficial also for private sector projects although in their case the presented procedural solutions need not be adhered to.

<sup>6</sup> Cooperation and the related building of a joint organisation and project vision as well as creation and maintenance of project procedures are indispensable for a successful alliance project although they are excluded from this survey which focuses on the technical ground rules of the alliance.

vices. The groups met regularly to comment on and direct development work and ideate new procedural solutions. Several dozen such workshops were conducted, and the time spent attending them corresponds to a few person-months of labour.

Workshop activity was speeded up by literature surveys and presentations as well as procedural constructions prepared in advance by researchers.<sup>7</sup> Although an attempt was made to utilise existing knowledge to the fullest, the research approach is rather constructive as a whole due to the scope and multiformity of the problem. The aim is to test the workability of solutions through later application and further development. The parties appear to be committed to the implementation of (at least a few) projects by the devised procedural solutions and their derivatives. Thus, the wide participation in the development project also prepared and committed the markets so as to allow launching actual test as soon as possible. At publication, the pilot projects are still under planning.

## **1.4 Content and structure of publication**

The publication analyses the principles and conditions for use of project alliance with special focus on the different procedural solutions of the alliance project:

- Chapter 2 begins by examining the features of project alliance and the advantages it can provide as well as possible related problems.
- Chapters 3–6 deal with the various solutions of project alliance taking a detailed look at the procedural solutions developed as part of the work.
- Chapter 7, finally, views the alliance as a whole and seeks to answer the key questions related to the application and introduction of project alliances.

The key solutions are presented in the body of the text and related figures and tables. Their reading gives one a general view of the main principles of project alliance. The supplementary (coloured) information tables analyse the reasoning behind solutions and their backgrounds or produce other additional information that can be skipped by those only wishing to learn the basic principles of project alliance. They constitute a sort of continuation course on the alliance theme and, to some extent, development-related documentation. The comments in the footnotes serve partly the same purpose and references have been placed there to improve the readability of the body of the text.

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<sup>7</sup> In many instances one or more solutions presented in literature were used as the starting point and were then frequently worked over as the discussion proceeded and new insights were gained. Thus, the connection to other presented solutions is not clear, and even apparently similar solutions deviate in most cases from the original ones. That makes definitive references unjustified, but Ross (2006) deserves to be mentioned as a publication that introduces new practical procedural solutions.

## 2. Main principles and potential

*This chapter describes the main principles of project alliance by defining the alliance-type procurement method and by outlining its features of various levels. It also tries to clarify the difference between alliancing and other procurement methods. General evaluation of the possibilities and weaknesses of alliances are also dealt with here.*

### 2.1 Definition and basic elements

The concept of *alliance* refers generally to an association and agreement between actors aimed at integrating their goals and/or operations. An arrangement of the type made for a given project is called a *project alliance*<sup>8</sup> or an *alliance contract*, which is accurately defined (for the purposes of this publication) as follows:

- **Project alliance** is a project delivery method based on a *joint contract* between the key actors to a project whereby the parties assume joint responsibility for the design and construction of the project to be implemented through a *joint organisation*, and where the actors *share* both positive and negative *risks* related to the project and observe the principles of information accessibility in pursuing close cooperation.

Project alliance is a collaborative delivery method by nature, intended to ensure cooperation through the contract forms used. Thus, project alliance can be *primarily* described through its *structural* and *collaborative features*.<sup>9</sup>

#### Features related to structural arrangements

- **Joint agreement.** The tasks of an alliance include project planning and implementation tasks and (possibly) ones related to them and to the promotion of the project traditionally performed by the owner, which said actors are jointly responsible for. The parties enter into a *single joint multi-actor contract* instead of several bilateral contracts (different in spirit).

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<sup>8</sup> Project alliance is a procurement model agreed and used for a certain project. The “project” prefix is intended to distinguish it from so-called strategic alliance which is a collaborative arrangement covering several projects or other long-term activity.

<sup>9</sup> The starting point of the analysis is Yeung et al. (2007) although three so-called structural features have been recorded instead of the original two. The content probably follows the spirit of the original analysis even if owner participation is stressed here (cf. Ross 2006) in distinction to Design-Build which involves cooperation and risk sharing and is implemented by a consortium (see Table 1).

- **Joint organisation.** The alliance organisation comprises people from all partner organisations, including the owner's. Decisions on project implementation are taken jointly by the parties. The cost estimate covers all related tasks and persons. The project target cost is defined correspondingly to include the items of various parties and is consequently the total cost of the project.
- **Risk sharing.** Alliance partners share the risk of project implementation as concerns the bulk of both positive and negative risks. Thus, the reward of service providers is also based on the success of overall project implementation, not on their performance of their own tasks. The practice requires observing the principles of openness in cost monitoring.

### **Features related to nature of collaboration**

- **Trust.** Trust between the partners is a central element of project alliance. It is difficult to derive any benefits from a model based on risk sharing and openness without it. The development of trust is tied to emotional and human behaviour and takes time: thus the arduous actor-selection phase and its knowledge intensity and workshops are a natural part of the alliance.
- **Commitment.** Internalisation of the alliance's common goals, resolution of problems faced and continuous improvement are possible only when the actors are committed to the project. Commitment is determination which people try to create by incentive systems and joint decision making as well as appropriate organisation structures which also contribute to an atmosphere of trust.
- **Cooperation.** Project alliance brings the key partners to a project under a joint and several contract with the intent of improving and increasing the parties' mutual cooperation and interaction: they are the key factors considering the workability of the alliance. Efforts can be made to improve the preconditions for efficient operations and information exchange by joint space arrangements and information systems as well as prearranged decision-making principles.

Of the above, *structural features* are unambiguous and absolute (hard); in their absence a project cannot be implemented as an alliance project. Yet, *collaborative features* are as much characteristics of and preconditions for functioning project alliance though difficult to concretise and distinguish by differences of degree (soft). Thus, making them the primary basis of the definition of project alliance is not sensible.

In addition to the presentation of processes and grounds for decisions, the publication focuses specifically on *structural features*, which is why project alliance can also be considered a project procurement method in its own right (cf. Table 1).



Table 1. Comparison of project alliance with other operational models.

<p><i>Project alliance</i> is a relatively new concept. Although much effort has been put into defining its content, accurate internalisation of its basic idea may be difficult without comparing it to other similar approaches and concepts.</p>	<p>Project alliancing, on the other hand, is both a collaborative procedure and a procurement method.</p>
<p><b>Alliancing and cooperation</b></p>	<p><b>Alliancing and procurement methods</b></p>
<p>Project alliance emphasises trust between the parties, commitment to goals and cooperation. In a working alliance the parties keep up the team spirit and maintain proactive and active information exchange. The actors also respect each other's opinions and consider them in their own activities.</p>	<p>It has also often been suggested (e.g. Walker and Hampson 2003a) that the difference between <i>alliancing</i> and <i>partnering</i> is that in the latter the monetary reward of a supplier may vary according to performance, but only based on its own partial performance (it may even increase at the cost of others; Walker et al. 2002), whereas the economic result of all partners in an alliance project depends on the success of the overall project.</p>
<p>Thus, another approach stressing similar issues, i.e. <i>partnering</i>, naturally often surfaces in discussions about project alliance. It always emphasises</p>	<p>One definition maintains that an alliance exists when risks are shared between a minimum of three partners (Halman &amp; Braks 1999).</p>
<ul style="list-style-type: none"> <li>• trust between the parties, and</li> <li>• mutual understanding.</li> </ul>	<p>From the viewpoint of this research, the above as such is not enough to make alliancing a procurement method in its own right. Incentive payment bases can be used in many ways in different procurement methods. For instance, in DB, the reward of both the contractor and the designer may be tied to the success of the overall project (cf. Tanner 1998; Lahdenperä 2001).</p>
<p>Some of the following features are typically also part of <i>partnering</i> projects (Nyström 2005):</p>	<p>The decisive factor in the definition of procurement methods is usually the content of the performance obligation which is central also here. Although the division of tasks is planned also in an alliance, a certain joint performance obligation exists in project alliance due to the joint organisation and decision making that include the owner – all share responsibility for the overall project; it is not merely a question of payment bases. For instance, in the DB model, the DB contractor makes decisions on implementation alone within the set boundary conditions.</p>
<ul style="list-style-type: none"> <li>• quality-based implementer selection</li> <li>• activities undertaken to boost team spirit</li> <li>• regular cooperation and feedback meetings</li> <li>• open information exchange</li> <li>• use of an impartial facilitator</li> <li>• defined problem-solving method</li> <li>• application of economic incentives.</li> </ul>	<p><b>Other concepts and views</b></p>
<p>The above factors are also likely features of project alliance though practical arrangements may vary. Yet, there is a clear difference between a <i>project alliance</i> and <i>partnering</i>.</p>	<p>As far as is known, only separate project alliances for construction and maintenance have been used, but life-cycle alliances have at least been planned (Clifton &amp; Duffield 2006). However, due e.g. to the long-term obligations, the latter often necessitate founding a separate project company which may mean <i>partnership</i> arrangements, etc.</p>
<p><i>Partnering</i> focuses on improving cooperation but is based on traditional contractual frameworks (Walker &amp; Hampson 2003a; Ross 2004; Yeung et al. 2007; Scott 2001) such as traditional contracting or Design-Build (DB). The partnering charter signed by the parties is, however, a deviation from traditional models. It basically lists the proper agreed main principles of cooperation but is not a legally binding document.</p>	<p><i>Joint ventures</i> are also common in construction. They are generally entered into by service providers to perform a certain undertaking with joint resources. They differ from project alliances in that e.g. the owner is not covered by the contractual agreement (ACEA 2005).</p>
<p><i>Project alliance</i>, again, differs from traditional risk-allocating contractual frameworks as it promotes procedures that stimulate cooperation also through contractual means. Thus, partnering is “merely” a collaborative procedure, not an actual construction procurement method (or project delivery system)</p>	

Project alliance typically also includes some *secondary features* such as early selection of service providers (in relation to design process) and design workshops during selection. Without them, it is difficult to create a cooperation model based on trust where the target cost level is fixed only after selection of the partners. Other examples are joint definition of goals and the strive for continuous improvement. The *secondary features* commonly manifest themselves in alliancing, but project alliance may also be realised without these elements, and therefore their use in defining the procurement method is not justified. On the other hand, it is also partially a question of a solution of applying alliancing that is dealt with later in this work.

## 2.2 Opportunities and risks

Relayed experiences about project alliance have so far been almost exclusively positive.<sup>10</sup> The method has been reported to have cut project costs, speeded up implementation, and helped attain several other qualitative aims of projects. When considering the application of this procurement method in new projects and conditions, earlier experiences must nevertheless be regarded only as possibilities – there is no certainty of success. The owner and the partners must, therefore, compare potential benefits to possible failures case by case while launching new projects. To assist in that, Table 2 summarises the potential benefits and weaknesses of an alliance on a general level.

*Table 2: Part 1 of 2. Evaluation of project alliance.<sup>11</sup>*

Benefits and opportunities	Weaknesses and threats
<ul style="list-style-type: none"> <li>• Early selection of service providers and cooperation enable relatively quick project implementation</li> <li>• Incentives boost realisation of qualitative goals related to interest groups, the environment, society, etc.</li> <li>• The collaborative arrangement promotes transfer of knowledge and learning as well as professional development of staff</li> <li>• The procedure minimises the need of contract management due to changes during work and different interpretations</li> </ul>	<ul style="list-style-type: none"> <li>• The cooperation model and shared risk limit the possibility to seek compensation for others' mistakes</li> <li>• Liability insurance may not cover damage caused by one alliance partner to another in the alliance relationship</li> <li>• Joint discharge of warranty obligations after implementation is a challenge as the organisation has practically dissolved</li> <li>• Changed roles and close cooperation provide an opportunity for evaluation and recruitment of staff or other companies</li> </ul>

<sup>10</sup> See e.g. literature listed in footnotes 2 and 3.

<sup>11</sup> Edited mainly from: Ross (2003a; 2004; 2006); Scott (2001); KPMG (1998).

Table 2: Part 2 of 2. Evaluation of project alliance.

Benefits and opportunities	Weaknesses and threats
<ul style="list-style-type: none"> <li>• Successful projects improve reputation and competitive position of project partners in future quality-based competitions</li> <li>• Decision making is based on comprehensive know-how, and project risks are understood more holistically than normally</li> <li>• Life cycle economy of implementation solutions also improves with increased responsibility due to the joint approach</li> <li>• The collaborative procedure improves innovation opportunities and possibly also promotes sector development</li> <li>• A working implementation method allows benchmarking and benefits indirectly other projects and their development</li> <li>• The operational model allows practicing cooperation for possible later strategic alliance</li> <li>• Staff's higher job satisfaction and commitment have a positive impact on partners' organisation cultures</li> <li>• The success and principles of the alliance may be used as a catalyst for developing the rest of the organisation</li> </ul>	<ul style="list-style-type: none"> <li>• The model requires commitment by partners' upper management which may be a challenge amid the daily rush</li> <li>• Abandoning old set ways in favour of a collaborative culture is demanding and laborious and may fail</li> <li>• The procedure is new and its introduction may fail which would be a blow to partners' reputation in general</li> <li>• Creation of a collaborative culture and establishment and maintaining of an alliance require a lot of effort and resources</li> <li>• Failure to direct incentives according to project's aims when measurable aims deviate from original ones</li> <li>• The model leans heavily on personal relations and trust, and it is possible to fail in building them</li> </ul>
<b>Specifically for owner</b>	<b>Specifically for owner</b>
<ul style="list-style-type: none"> <li>• Transparent pricing and cost monitoring provide a better real time understanding of the project situation</li> <li>• Incentives and cost-based payment (no risk reserves) are likely to allow realising the project at a competitive price</li> </ul>	<ul style="list-style-type: none"> <li>• The joint organisation and decision making force the owner to give up part of its authority in the project</li> <li>• The actual price level of the project is not certain until completion, the maximum price being a possible exception</li> <li>• The low-key price competition makes it difficult to prove financial soundness to those monitoring the public owner</li> <li>• Payment based on realised costs increases the risk of opportunistic and skewed cost allocation</li> <li>• The model requires active participation of the owner organisation and allocation of key resources for the project's use</li> <li>• Staff members of the consortium that won the quality-based selection may be replaced by others as the process continues</li> </ul>
<b>Specifically for service providers</b>	<b>Specifically for service providers</b>
<ul style="list-style-type: none"> <li>• Excellent performance will enable service providers to reap big rewards (in relation to borne risk)</li> <li>• The model allows success through knowledge and development without involvement in unhealthy price competition</li> <li>• Better understanding of customer needs and activities allows improving own service ability and competitiveness</li> </ul>	<ul style="list-style-type: none"> <li>• The partners bear risk for the entire project and actions of others that they can influence only marginally</li> </ul>

## 3. Selection of service providers

*This chapter examines how the alliance implementing organisation is selected and put together through competitive dialogue. An answer is sought especially to how the selection process moves forward and divides into phases, and which qualitative criteria are used to evaluate candidates and tenderers. The content of the call for tenders is also outlined.*

### 3.1 Selection process

The process of selecting the implementers of project alliance has several phases. They are described below in more detail on the task level (Figure 1).<sup>12, 13</sup>

#### *Launching of procurement*

- 1. Preparation of project alliance.** The owner makes the decision to use project alliance. The procurement process is normally based on an order authorisation from Parliament which, again, requires a legally valid transport infrastructure plan (road, rail or street plan) and a project cost estimate based on it. The goal is to use simulation in preparing the cost estimate (cf. Ch. 4.1) where the order authorisation corresponds, for instance, to a cost level that will be underrun with 90 % probability (so-called P90 level). At the same time, the owner commits its organisation to alliance-type implementation, chooses its project representatives and evaluation team, and provides the sector with advance information on the upcoming project and its implementation as project alliance. If necessary, the owner complements the transport infrastructure plan as required by the chosen procurement method as well as commissions complementary soil investigations, etc.
- 2. Preparation of procurement notice.** A public owner prepares a procurement notice on the project as required in public procurement and transmits it for publication.<sup>14</sup> The procurement procedure is either a *negotiated procedure* or a *competitive dialogue*. The procurement notice provides information on the project, the selection process and the roles of partners. It also indicates the minimum and elimination cri-

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<sup>12</sup> The times of the figure are indicative task-specific minimum durations. The total duration of procurement is generally longer than the sum of the presented time periods.

<sup>13</sup> Complementary material on the implementation of selection is found e.g. in relation to public procurement guidelines (Pohjonen 2007) and the organisation and methods of decision making (Lahdenperä & Sulankivi 2001).

<sup>14</sup> In Finland procurement notices are to be transmitted for publication on the free, electronic HILMA information system at [www.hankintailmoitukset.fi](http://www.hankintailmoitukset.fi) as determined by the Ministry of Employment and the Economy.

teria and the time of the informative meeting. An official procurement notice is always complemented by more comprehensive project material which describes, for instance, the formation of the alliance and provides more detailed information of the project. The notice enables the candidates to launch the assembly of a candidate consortium and/or organisation as well as to prepare their request to participate.

- 3. Organising of informative meeting.** The owner organises an informative meeting where companies considering submitting a request to participate are informed about the operating principles of the alliance and the details of the selection process. At the meeting candidates can ask questions about the project. All asked questions and elaborated answers are submitted in writing to all participants after the meeting.

#### *Verification of qualification*

- 4. Submitting of a request to participate.** Candidates announce their participation in the selection by submitting a request to that effect to the owner. A candidate may be a company providing design and construction services through its own organisation, but normally it is a consortium that offers the mentioned and other necessary services. The content and structure of the request must conform to the owner's requirements set out in the procurement notice. By the material they provide, companies try to prove that they are qualified to be an implementer: after the material has been used to evaluate the candidates' basic qualification as implementers, it is used to rank them.
- 5. Selection of candidates.** The owner evaluates the received requests to participate based on the announced minimum criteria (Table 5). On the basis of that evaluation the owner decides which candidates qualify for the next round and which are rejected. Candidates that meet the minimum criteria are invited to interviews; the rest are excluded.

#### *Reducing the number of candidates*

- 6. Preparing for interviews.** The owner prepares the topics/themes and implementation of interviews. Candidates' requests to participate are also evaluated preliminarily in order to determine the need and subject of elaborated questions. At the same time, the owner and the candidates start to commit their key personnel and coach their teams. The candidates get ready to present their competence and references.
- 7. Conducting of interviews.** Each candidate is interviewed separately. The sessions are led by the owner and last, for instance, three hours. During the sessions candidates demonstrate their competence through presentations prepared in advance, but the main focus is on the owner's prepared questions intended to specify the information of the candidates' requests to participate (references, organising principles, key

personnel, etc.). The possible technical and organisational features of the project are not actually discussed yet during the interviews. However, the aim is to ensure that the candidates have understood the principles and procedures of project alliance and are able to commit to them.

- 8. Selection of tenderers.** Interviews are evaluated immediately after the sessions by an evaluation group. A summary is made of the interviews where companies' competence, experience from demanding projects, intended key personnel and proof of capacity for cooperation are assessed (Table 6). Then the owner selects the three best candidates for the next round, and the rest are eliminated.<sup>15</sup>

### *Selection of best tenderer*

- 9. Delivery of call for tenders.** The owner sends a call for tenders to the three best candidates (Table 3).<sup>16</sup> It specifies the selection criteria<sup>17</sup> and presents the tentative bill of quantities for the project and the corresponding detailed cost estimate, tentative price elements (averages of similar realised projects) common to all for calculating the tender price, the allocation of tasks and risks between the owner and the alliance, and the basis of payment system and its tentative qualitative target areas and their estimated bonus potential. The material also includes comprehensive project data. Along with the call for tenders, the owner also sends candidates an invitation to a selection workshop and its programme.

- 10. Submitting of Part I of tender.** Tenderers prepare the reports required for the Phase I tender, including a budget critique. In it they evaluate the feasibility of the plans within the set budget framework, bring out the project's risk factors and their cost effects and, particularly, address the tentative price factors (used to calculate the tender price) that are common to all (cf. Ch. 4.2). Tenderers also provide feedback on the draft alliance contract and comment/prepare proposals for indicators for measuring qualitative target areas. Candidates also prepare a project organisation plan and a tentative project plan as part of their tender. Tenderers submit Part I of the required tender material to the owner by the date indicated in the call for tenders, i.e. before the workshop.

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<sup>15</sup> When using the negotiated procedure or the competitive dialogue, at least three candidates must be invited to the tendering process unless there are fewer suitable candidates (Laki... 2007). Tender phase workshops are so laborious that it is generally not justified to invite more than that minimum number.

<sup>16</sup> Table 3 shows the tentative table of contents of a letter of invitation. It lists the key issues of the call for tenders and is complemented by broad reference material. It is the Finnish Road Administration's presently used model of a letter of invitation complemented e.g. with those sections of calls for tenders of executed alliance projects (VicRoads 2005; 2006) that will be new additions to project alliance.

<sup>17</sup> It should be noted that criteria cannot be changed to the extent that they have already been presented.

**11. Preparing for selection workshops.** The owner's evaluation and project groups prepare the content and organisation of the workshop and plan the workshop tasks. The evaluation group examines submitted Parts I of tenders in order to identify the features of tenders that need further clarification and revisions that allow making a decision later on the suitability and merits of tender solutions. Tenderers, for their part, get ready for presenting their tenders and discussing the features and development possibilities that do not clearly conform to the call for tenders.

**12. Conducting a selection workshop.** In the workshop tenderers present the so-called qualitative section (Part I) of their tender to the owner, and the owner asks elaborating questions about it. Discussions may focus on changes in the content of requirements and/or a design as well as on tentative innovation possibilities on which a common view is sought.<sup>18</sup> The draft alliance contract is also dealt with. Moreover, the persons appointed by the owner to the project and the tenderer's representatives constitute a team that jointly solves project-related workshop problems as an experiment. In the evaluation of the task section, attention is paid to team work, utilisation of know-how, leadership and outcome. The owner's evaluation group assesses workshop performance in accordance with the evaluation criteria (Table 7) immediately after the workshop and prepares a summary including reasoning. A workshop is conducted separately for each tenderer, and its practical duration is typically about two working days. Issues raised in discussions at workshops are treated as confidential information.

**13. Specification of call for tenders.** The owner may specify the call for tenders, if necessary, due to issues that come up during workshops that require specifying project content, the cost estimate, the draft contract or qualitative requirements. At the same time, the owner fixes the price elements common to all used in determining the tender price. The owner submits the revised call for tenders to all tenderers.

**14. Submitting of Part II of tender.** Tenderers submit to the owner Part II of the tender which contains at least the unit and total costs of the cost items requested in the call for tenders which are not included in Part I. The qualitative section of the tender is also complemented as necessary (Part I): to the extent that the specified call for tenders, the elaborating questions posed at workshops or solutions developed in workshops require.

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<sup>18</sup> Design by the owner based solely on performance criteria has so far been considered problematic since excessive degrees of freedom that might lead to still unidentified, possibly tendered, solutions that are found unworkable, might be accepted. Therefore, it can be assumed that tenderers find the owner's calls for tender plans to limit solutions to some extent. The evaluation of tentative innovation possibilities at workshops is, for its part, intended to lead the discussion toward novel implementation solutions so that the conformity with requirements or the possibility of changing requirements can be ensured already before submitting the final tenders since degrees of freedom are generally difficult to set. This justifies the need of workshops which are also indispensable for the evaluation of the team's ability to perform its function and the building of a confidential collaborative relationship.

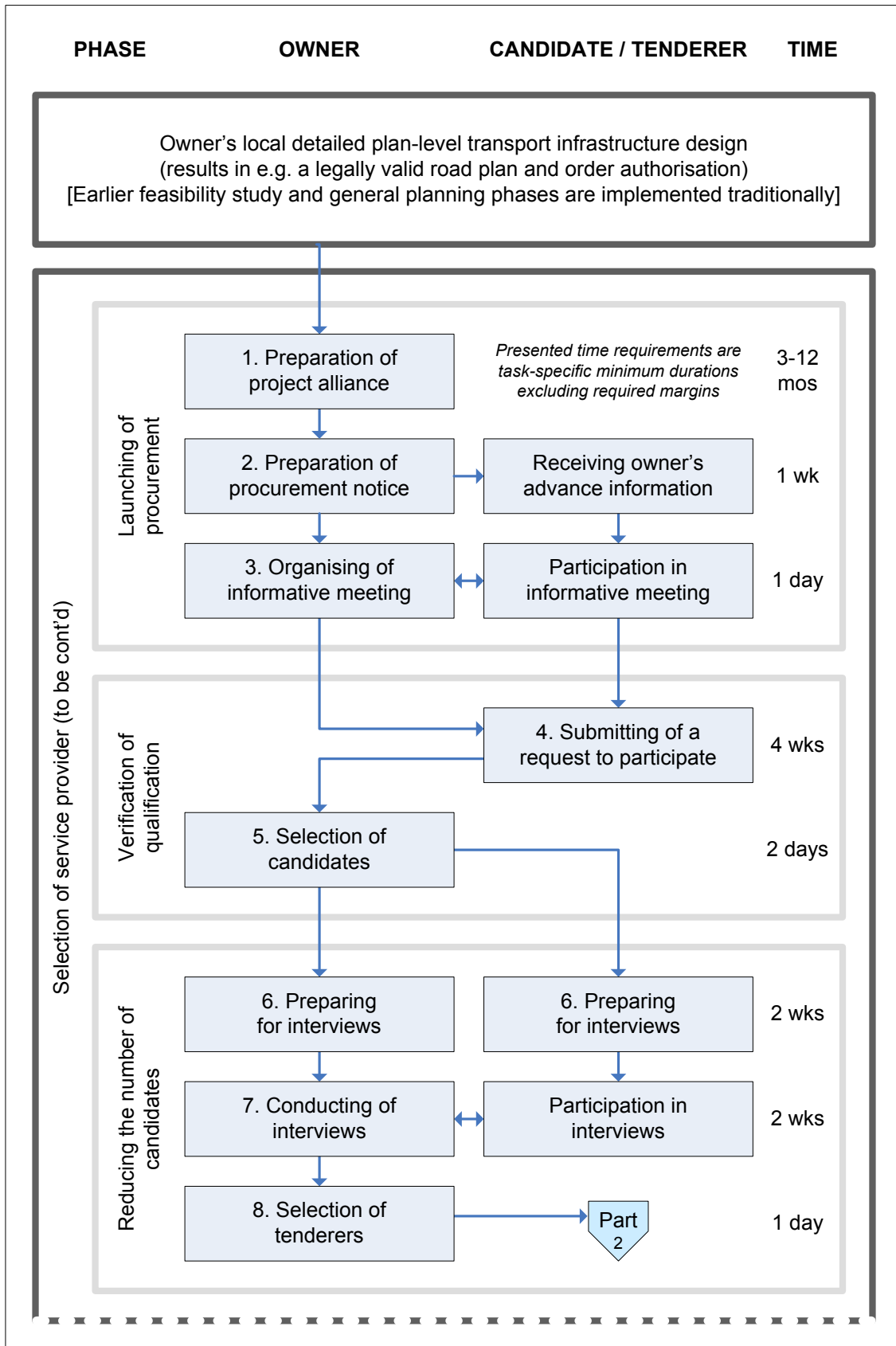


Figure 1: Part 1 of 2. Selection of actors for project alliance.



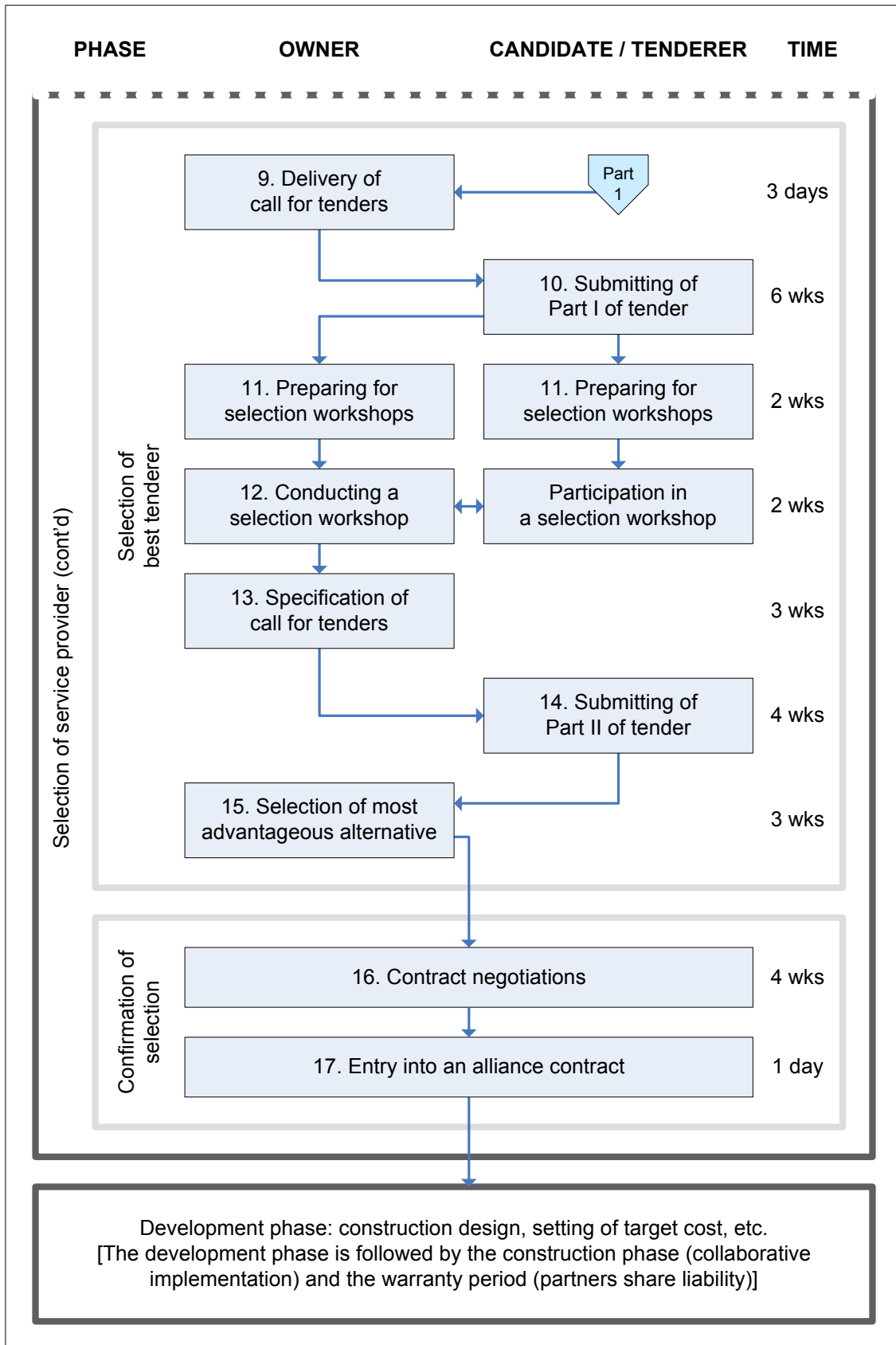


Figure 1: Part 2 of 2. Selection of actors for project alliance.

*Table 3. Suggested content of letter of invitation in a road project.*

<b>Introduction of call for tenders</b>	<b>Review of documents appended to call for tenders</b>
<b>Key content of call for tenders</b>	
Interaction during tender preparation and contact person	Draft of alliance contract
<ul style="list-style-type: none"> <li>• Correspondence and additions</li> <li>• Document management</li> </ul>	<ul style="list-style-type: none"> <li>• Suggested alliance structure</li> <li>• Foundation of alliance</li> <li>• Key features of alliance contract <ul style="list-style-type: none"> <li>– negotiating mechanism and conditions for changing contract during validity</li> </ul> </li> <li>• Key commercial conditions</li> </ul>
Tender submission	Conditions of alliance contract
<ul style="list-style-type: none"> <li>• Confidentiality</li> <li>• Structure of written proposals</li> </ul>	<ul style="list-style-type: none"> <li>• Roads and structures to be built</li> <li>• Health-and-Safety File</li> <li>• Documentation procedures</li> <li>• Implementation and timing</li> <li>• Ownership of tenders</li> <li>• Conflicts of interest</li> <li>• Disclaimer</li> <li>• Scope of alliance work</li> <li>• Payment bases (benefit sharing and rewarding method)</li> </ul>
Acceptability of tender	
Delivery of tender to owner	
<ul style="list-style-type: none"> <li>• Dating and validity</li> <li>• Signatures, identity</li> </ul>	
Required content of Part I	
<ul style="list-style-type: none"> <li>• Information presented at workshops</li> </ul>	
Required content of Part II	
Tender processing in general	
<ul style="list-style-type: none"> <li>• Overview of processing</li> <li>• Owner's processing and management teams</li> <li>• Selection schedule</li> <li>• Evaluation team's functions</li> </ul>	
Tender processing, Phase I	
<ul style="list-style-type: none"> <li>• Selection criteria</li> <li>• Tender evaluation principles</li> </ul>	
Specification of call for tenders	
Tender processing, Phase II	
<ul style="list-style-type: none"> <li>• Evaluation of specifications</li> <li>• Tender price calculation</li> </ul>	
Rejection of tenderer	
Rejection of tenders	
Procurement decision	
Publicity of tender information	
Contract review and birth of contract	
Tender compensation	
<ul style="list-style-type: none"> <li>• Compensation of tenderers' costs</li> </ul>	<ul style="list-style-type: none"> <li>• Itemised project cost estimate (complements cost confidence levels and cumulative cost curve)</li> </ul>

**15. Selection of most advantageous alternative.** The owner completes the evaluation of received tenders as to qualitative factors: suggested organisation, project management procedures and implementation solutions are considered along with evaluation of workshop performance (Table 7). The most advantageous tender from the overall economic viewpoint is determined based on qualitative evaluations, calculated tender prices (see Ch. 4.2) and preset weighting of criteria. The tenderer having submitted the most advantageous offer is selected for negotiations and a related official procurement decision is made.

### *Confirmation of selection*

**16. Contract negotiations.** Negotiations with the tenderer having submitted the economically most advantageous tender are launched to specify contract details.

**17. Entry into an alliance contract.** The owner and tenderer (various companies of the consortium) enter into an alliance contract which stipulates the conditions for the implementation of the project with the exception of target cost. It is fixed only after the development phase (see Ch. 4.3). The calculated tender price sets the upper target cost limit which (or actually its later revised equivalent) becomes the target cost unless a lower target cost can be produced during the development phase subsequent to the signing of the contract.

## **3.2 Selection criteria**

Different phases of the selection process for the implementer of the alliance contract use different criteria: at first minimum criteria concerning candidates are applied, followed by elimination (or shortlisting) criteria, and lastly tender evaluation criteria (Table 4).<sup>19</sup> The meeting of minimum criteria (A) is evaluated on the basis of the request to participate, and that of elimination criteria (B) on both the request to participate and interviews. Tender evaluation has two phases. First, Part I of the written tender (C1–C3), submitted before the workshops are conducted, and the workshop performance of the tenderer's project group (C4) are assessed. After the workshops, Part II of the tender including price data (C5) is submitted as well as other information required by the specification of the call for tenders. The criteria are examined in detail by phases below.

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<sup>19</sup> A call for tenders must present to the tenderer the requirements for tender contents (name and key contents of document and minimum requirements) and in connection with comparison criteria how tender contents are evaluated (what in the document is assessed). The criteria presented in this chapter that raise up these areas are merely suggestive and need to be concretised for practical procurement situations.

Table 4. Selection criteria for service providers in project alliance.

Selection phase >	Verification of qualification	Elimination of candidates	Selection of consortium		
Basis of evaluation >	Request to participate	Request to participate	Candidate Interviews	Tender, Parts 1&2	Selection workshops
Selection criteria					
<b>A. Minimum criteria</b>					
A1. Financial capacity of companies	●				
A2. Legal obligations	●				
A3. Sector and alliance competence	●				
<b>B. Elimination criteria</b>					
B1. Competence and technical capacity		●	●		
B2. Proof of successful operations		●	●		
B3. Project organisation and cooperation		●	●		
<b>C. Evaluation of tender</b>					
C1. Organisation and principles of cooperation (Part I)					
• Alliance organisation				●	●
• Project management and operating principles				●	●
C2. Project management procedures (Part I)					
• Management of project quality and env. issues				●	●
• Safety management				●	●
• Risk management				●	●
C3. Implementation solutions and costs (Part I)					
• Technical approach to project implementation				●	●
• Budget critique				●	●
C4. Workshop activity (not part of tenders)					
• Commitment, attitude and cooperation of team					●
C5. Calculated tender price (Part II)				●	

Although both phases of selection focus on the evaluation of the competence of actors, the general principle is that each selection criterion is used only in one phase<sup>20</sup> of the selection process and the elimination-phase evaluations and corresponding scores of candidates are not considered as such at the tender evaluation phase.

<sup>20</sup> Courts have intervened in cases where clear enough distinction has not been made between reducing the number of candidates and tender evaluation as concerns suitability criteria. Thus, qualitative criteria must evolve between these phases from evaluating qualifications toward evaluation of project-specific procedures although in the case of project alliance evaluation during both phases focuses on quite similar issues.

## Verification of qualification

Application of minimum criteria ensures that candidates have the basic qualifications for successful implementation of the construction project in question. Minimum requirements include, for instance, that candidates have a transparent financial monitoring system suitable for cooperation as well as the required experience from design management and organising and implementing of projects involving design. Table 5 shows the requirements of minimum criteria and the proof required by the owner of meeting them. Candidates that meet the minimum requirements qualify and are invited to interviews organised by the owner. Candidates that fall short of the minimum requirements are rejected.

*Table 5. Requirements of minimum criteria and required proofs.*

REQUIREMENT	PROOF
<b>A1. Financial capacity of companies</b>	
<ul style="list-style-type: none"> <li>• Creditworthiness</li> <li>• Capital adequacy</li> <li>• Sufficient turnover in relation to scope of project (euro-denominated requirement)</li> </ul>	<ul style="list-style-type: none"> <li>• Free-form statement from bank on tenderer's creditworthiness</li> <li>• Financial statements (last 2–3 years)</li> <li>• Financial statements (last 2–3 years)</li> </ul>
<b>A2. Legal obligations</b>	
<ul style="list-style-type: none"> <li>• Entered in trade, prepayment, employer and VAT registers</li> <li>• Has paid tax obligations and employees' social security and pension contributions</li> <li>• The obligatory (and discretionary) grounds for exclusion of the Public Procurement Act are not met (see: Laki... 2007).</li> <li>• General accepted terms of employment</li> </ul>	<ul style="list-style-type: none"> <li>• Extracts from registers or RALA certificate (see: Rakentamisen... 2008)</li> <li>• Certificates or corresponding schedules of payment and statements</li> <li>• (Proof from candidate is not required)</li> <li>• Proof of collective agreement or key terms of employment applied to work</li> </ul>
<b>A3. Sector and alliance competence</b>	
<ul style="list-style-type: none"> <li>• Suitable sector competence (Design-Build projects)</li> <li>• Quality assurance system verified by a third party</li> <li>• Transparent financial monitoring system suited for cooperation</li> <li>• Candidate has experience from sufficiently large projects and ones involving design and design management</li> </ul>	<ul style="list-style-type: none"> <li>• References and/or RALA certificate</li> <li>• Certificate of system conforming to a certain standard, acceptance of RALA procedures or equivalent</li> <li>• Description of used financial monitoring system</li> <li>• Project size (€m), number, time (last 5 years), projects involving design, cooperation with owner</li> </ul>

## Reducing the number of candidates

Candidates meeting the minimum requirements are ranked according to their merits, initially on the basis of the requests to participate they submitted to the owner. Candidates are also invited to interviews intended to clarify things already expressed in writing in the request to participate. On the basis of the interviews and the request to participate, the three best candidates are selected for the next round. These candidates receive the project's call-for-tenders material.

The criteria used at this stage are the candidates' competence and technical capacity, proof of successful projects and planned project organisation. The corresponding targets of evaluation and proofs required by the owner are listed in Table 6.

*Table 6. Targets of elimination criteria and required proofs.*

TARGET	PROOF
<b>B1. Competence and technical capacity</b>	
<ul style="list-style-type: none"> <li>• Technical capacity</li> <li>• Competent personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Management of special techniques, project management programmes, practices</li> <li>• Training, qualifications and special skills of personnel</li> </ul>
<b>B2. Proof of successful operations</b>	
<ul style="list-style-type: none"> <li>• Successful projects in key target areas (costs, schedule, structures, safety, environment, quality, traffic control)</li> <li>• Successful development solutions and implemented innovations (processes, management, technical solutions, finance)</li> <li>• Best practices in risk management</li> <li>• Client relationship management (owner, interest groups)</li> </ul>	<ul style="list-style-type: none"> <li>• References from the viewpoint of key target areas and possible public recognitions</li> <li>• Descriptions of development work arrangements and resulting solutions and practical applications and benefits derived from the solutions</li> <li>• Description of risk management practices and possible concrete lessons learned from projects</li> <li>• Feedback on cooperation, user feedback, written statements, assessments, feedback (e.g. from Propal system; see Rakentamisen... 2008)</li> </ul>
<b>B3. Project organisation and cooperation</b>	
<ul style="list-style-type: none"> <li>• Forming of project organisation</li> <li>• Suggested key persons</li> </ul>	<ul style="list-style-type: none"> <li>• View of alliance process, project organisation and its operations and their underlying principles</li> <li>• Appointed key persons: project and design manager and other key project personnel (names, experience; CVs)</li> </ul>

## Selection of best tenderer

Evaluation of offers divides into two phases. The issues of the qualitative Part I (Table 7, Sections C1–C3) and workshop performance (Section C4) are evaluated first. At this phase, emphasis is on the suggested organisation and operating culture, project management procedures and implementation solutions and costs. After the selection workshop, the second part of the written tender, which contains the issues of Part I of the tender dealt with in the workshop and updated to the extent necessary, as well as Part II of the tender, that is, certain price data (Section C5), are submitted for calculating a tender price (cf. Ch. 4.2). The candidate that submits the most advantageous tender from the overall economic point of view is selected for negotiations.<sup>21, 22</sup> Finally, Table 8 ponders the consideration of the team viewpoint in the selection of the project alliance implementer and related workshops as well as in implementation.

*Table 7: Part 1 of 2. Targets of tender evaluation and required proofs.*

TARGET	PROOF
<b>C1. Organisation and principles of cooperation</b>	
Alliance organisation	
<ul style="list-style-type: none"> <li>• Organisation and its key support functions</li> <li>• Suggestions for holders of key roles (e.g. project manager, design team manager, persons in charge of parts of projects, project cost management and client relationships)</li> </ul>	<ul style="list-style-type: none"> <li>• Organisation chart</li> <li>• Appointed experts and process owners, their use of time and substitution arrangements</li> <li>• Resource availability survey (incl. starting times)</li> </ul>
Project management and operating principles	
<ul style="list-style-type: none"> <li>• Project-specific operational plans and procedures</li> <li>• Principles of collaborative procedures</li> <li>• Principles of orientation and alliance training and subcontracting</li> </ul>	<ul style="list-style-type: none"> <li>• Description of personnel management and activity</li> <li>• Description of team forming, development of cooperation and orientation procedures</li> </ul>

<sup>21</sup> According to the general guidelines for government procurement, price should carry a weight of at least 35–40 % when using relative weighting of criteria. Yet, in the case of service procurement, price may exceptionally also be given a weight of less than 35 %. (Hytönen & Lehtomäki 2007)

<sup>22</sup> The joint view of participating experts and practical actors is that price should generally carry a weight of no more than 20–30 % in project alliance. This is because better overall economy is pursued by putting together the best possible team of versatile know-how already at the stage when the implementation solution still can be influenced and improved. It also makes for more profound evaluation of qualitative factors than is the norm with other procurement methods. Know-how and cooperation are emphasised and must carry much weight. That is also necessary because as implementers are selected for the project in an early design stage, pricing also involves considerable uncertainty. (It must be noted that weighting as such is not a very good predictor of the outcome of selection since the formation of the final system is also influenced by e.g. the scoring of price and quality scales, etc.)

*Table 7: Part 2 of 2. Targets of tender evaluation and required proofs.*

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<b>C2. Project management procedures</b>	
Management of project quality and environmental issues	
<ul style="list-style-type: none"> <li>• Goals and procedures of total quality management</li> <li>• Goals and procedures of environmental management</li> </ul>	<ul style="list-style-type: none"> <li>• Description of total quality management procedures and control systems</li> <li>• Description of environmental management procedures and control systems</li> </ul>
Safety management	
<ul style="list-style-type: none"> <li>• Goals and procedures of safety management</li> </ul>	<ul style="list-style-type: none"> <li>• Description of safety management procedures and control systems</li> <li>• Overall safety, safety planning and training</li> </ul>
Risk management	
<ul style="list-style-type: none"> <li>• Goals and procedures of risk management</li> </ul>	<ul style="list-style-type: none"> <li>• Description of risk management procedures and control systems</li> <li>• Tentative risk analysis, critical points of project, risk factors</li> </ul>
<b>C3. Implementation solutions and costs</b>	
Technical approach to project implementation	
<ul style="list-style-type: none"> <li>• Technical implementation of project and tentative innovation possibilities</li> <li>• Project's production solutions and arrangements and tentative innovation possibilities</li> </ul>	<ul style="list-style-type: none"> <li>• Value adding solutions and innovative ideas suggested for the project</li> </ul>
Budget critique	
<ul style="list-style-type: none"> <li>• View of project's cost level and range, biggest uncertainties and ways of managing cost risks</li> <li>• Key means and solutions for lowering overall costs in project implementation</li> </ul>	<ul style="list-style-type: none"> <li>• Critical, comprehensive evaluation of owner's cost estimate</li> <li>• Suggestions for improving economic efficiency of project</li> </ul>
<b>C4. Workshop activity</b>	
Commitment, attitude and cooperation of team	
<ul style="list-style-type: none"> <li>• Commitment to membership in alliance team</li> <li>• Innovative approach and know-how</li> <li>• Capacity for problem solving</li> <li>• Management and leadership skills and know-how</li> </ul>	<ul style="list-style-type: none"> <li>• Proof of successful workshop performance (management, cooperation, utilisation of know-how, outcome)</li> </ul>
<b>C5. Calculated tender price</b>	
	<ul style="list-style-type: none"> <li>• Unit and total cost factors defined separately in call for tenders as specified by owner</li> </ul>

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*Table 8. Team viewpoint in selection and execution of project alliance.*

The basic idea of project alliance is to bring together the required knowledge at an early stage and to emphasise trust, commitment to goals and close cooperation between the partners. Its realisation requires examining e.g. the following factors related to projects:

**Key persons.** The key persons play a significant role in the implementation and definition of the procedures of an alliance project. Openness, leadership and innovativeness are desirable properties. Naturally, their competence must also meet the project's needs. The owner must appoint its project representative early enough for the tenderers to be able to take it into account when preparing their request to participate and/or tender.

**Selection workshops.** The aim of the alliance project implementers selection process is to find the best possible implementer team. Thus, it is essential to find actors who are competent professionals, whose competencies complement each other, and who are capable of working together. A good end result requires that communication between them is open, direct and confidential. Thus, evaluation of the team's cooperation on the basis of workshop collaborations is also emphasised in selection.

**Start time.** Tenderers suggest certain employees for key persons of the alliance project during the selection process. In practice, tenderers often have difficulties in making the appointed persons available for an alliance project starting at a certain time. Thus, it has been suggested that key persons be given a partially flexible start time that would allow better utilisation of the persons considered most suitable in alliance projects.

**Time of competition.** Designers and contractors operate in markets where they constantly compete for several projects. Permanent commitment of key persons to projects may be difficult since there are generally a few lost projects for each won one, and the resourcing of each project has to be planned. Thus, owners should avoid as far as possible inviting competitive tenders on other projects to coincide with alliance projects.

**Substitution arrangements.** In situations where a flexible start time is not sensible, arrangements must be made for providing substitutes. Tenderers appoint substitutes in connection with suggesting certain key persons. The owner decides separately in each case whether to accept a substitute.

Since implementer selection is largely based on key persons and their competence, a substitution arrangement like this is in contradiction with the alliance spirit. Acceptance of substitutes should, therefore, be based on interviews and workshop-type testing of capacity for cooperation. The time when the key personnel is committed "permanently" should be agreed in the same connection.

**Facilitator.** An expert on team or organisational activity, a facilitator, can be used to promote team formation and evaluate workshop performance. As an outsider, the expert can evaluate the team's functioning differently than the owner's representatives who participate in the work or project control or other members of the selection group. The expert's assessments form, however, only a part of the overall evaluation of performance in selection. The expert must be well versed in the goals and future challenges of the alliance team.

**Evaluation group.** The owner's evaluation group is a key actor in the selection process. The group must be put together early enough, and it must internalise the objectives and content of the alliance. The group should have experience from evaluating and using qualitative selection criteria. It is essential that the group has clear operating principles and sufficiently versatile competence. Use of external competent members should also be considered. Members must enjoy the confidence of competing teams which increases the companies' motivation to compete thereby improving the results of the project.

**Incontestability.** An alliance emphasises joint responsibility and avoidance of disputes. Besides making the actors seek cooperation, it also likely improves the information flow within the project. Defective or erroneous information is no longer a reason for contesting an issue, but all information is utilised. Incontestability is based on trust, not on a legally binding contract.

**Alliance team.** The alliance organisation should strive to use common symbols to create and maintain a team spirit. The logos of partner companies should not be visible to distinguish them from one another as they do their work. The team is to operate under the name and symbols of the alliance. Team formation and activity is also supported by common space arrangements. Moreover, in many collaborative projects the bases for decision making are created e.g. by defining how long issues may remain unsolved on each organisation level.

## 4. Cost planning

*This chapter focuses on the preparation of a cost estimate and its role at various phases of the alliance project. It attends to the inclusion of uncertainty in the estimate and calculation of the tender price as well as development-phase cost planning and its significance in fixing the payment basis.*

### 4.1 Project planning by owner

The owner has done project preparations for a long while before procurement is launched, and there is a legally valid transport infrastructure plan<sup>23</sup> for the project as well as a tentative cost estimate for the project decision and an order-authorisation application based on it. Since project alliance is typically applied to projects including much uncertainty, it is highly recommendable to (following the procedure illustrated in more detail in Figure 2)

- prepare a total cost estimate by simulation which systematically considers the internal uncertainty of different cost items in estimating overall risk and outputs overall project-level risk in graphic form<sup>24</sup>, and
- seek order authorisation for an overall risk level that considers project features and whose corresponding cost level has a sufficient probability of not being exceeded in implementation – that probability could justifiably be, for instance, 90 %.<sup>25</sup>

The owner's cost estimate data are to be available to candidates so that

- *the material complementing the procurement notice* presents the owner's view on total project costs and the uncertainty related to them (e.g. based on the cumulative cost curve/function) and the order authorisation (and possible so-called maximum price)
- *the material appended to the call for tenders* includes the owner's itemised cost estimate in its entirety for all companies selected as tenderers (in the earlier elimination phase) that need it to prepare their own tender (budget critique, pricing).

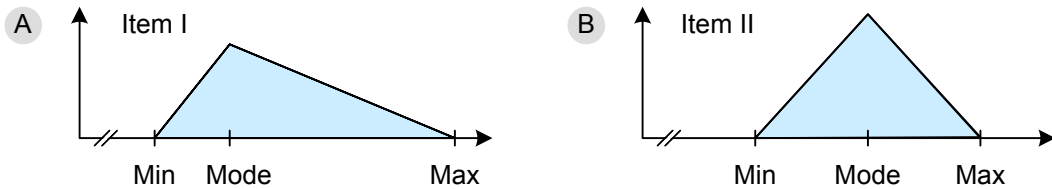
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<sup>23</sup> In practice it is a road, rail or street plan. This plan level is related to local detailed planning and defines the precise location of the transport infrastructure but does not as such serve the implementation of construction. Factors directly affecting land owners and other interested parties are decided on this level.

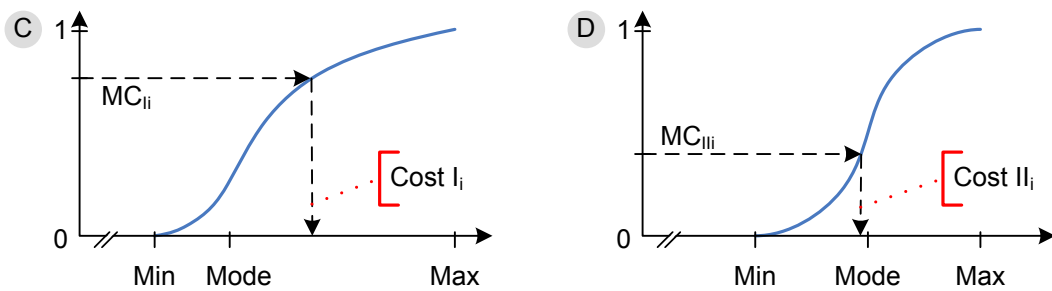
<sup>24</sup> Simulation based on random numbers is also known as the Monte Carlo method.

<sup>25</sup> This so-called P90 level has been used in at least a few projects (VicRoads 2005; 2006) as well as to make project decisions and describe the estimated cost level of projects in the call for tenders.

Cost probability distributions are approximated by some distribution which, at its simplest, may be e.g. a triangular distribution. There, each item of the cost estimate is determined based on three values: the optimistic (Min), the most probable (Mode) and the pessimistic (Max). The probability of the cost falling between the extreme values is assumed to be 100 % meaning that the area of the forming triangle is 1.00. There may be hundreds of cost items, but the illustration here uses just two (I and II; Figs. A and B).



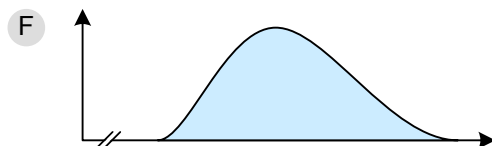
A cumulative cost function can be calculated for each triangular distribution to describe the cumulative probability of staying under a certain cost level (Figs. C and D for items I and II). The value of the function at cost level Max is 1. By generating a random number (MC) between 0 and 1 inclusive, one can use the cumulative cost function to determine the cost of the item corresponding to that random number.



By summing up the costs of all cost items based on random numbers, a single total cost estimate (E) is produced.

E 
$$\text{Total cost}_i = \text{cost I}_i + \text{cost II}_i + \dots + \text{cost N}_i$$

By repeating the process numerous times (>1000) using random numbers, a total cost distribution is produced (Fig. F) due to the different cost combinations of cost items.



The cumulative cost function (G) of the total cost probability distribution illustrates the uncertainty related to costs. The percentage depicts the probability of staying under the corresponding cost level. The key factors in decision making are:

- slope of the function (esp. in the middle)
- cost level corresponding to 50 % probability (median)
- mean of the distribution (not pictured), which in the case of positively skewed distributions of cost items (cf. Fig. A) is larger than the median of the overall distribution.

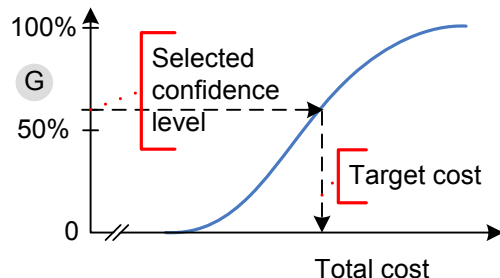


Figure 2. Principles of distribution and simulation based cost estimation.

The procedure is intended to reduce the input required of companies in the selection phase since

- in the elimination phase, when competition is based on competence, attention of many candidate companies is not yet unnecessarily focused on itemised cost estimates, and
- in the tender preparation phase prepared material and the items and calculation structures and other background information used for it are at the disposal of the companies.

The cost estimate becomes more accurate later during the process as the tender price is calculated (Ch. 4.2) and, finally, the target cost is determined (Ch. 4.3). These two cost levels form the basis of the alliance's payment basis system when cost-overrun and -underrun allotment percentages are known.<sup>26</sup> The allotments intended to be used in the project should be fixed to avoid surprises and announced already in the complementary material of the procurement notice in relation to the two conceptual cost levels (cf. Ch. 4.4) to rid selection of an excessive amount of variables that complicate comparison.

## 4.2 Calculated tender price

The selection of the implementer of project alliance is based on the most economically advantageous tender<sup>27</sup>, that is, both tender price and the qualitative evaluation are considered in selection. However, the price is not tendered as a total price since it is not practical to bring design to the level where a binding total price could be determined with sufficient accuracy. Thus, this so-called tender price<sup>28</sup> is calculated on the basis of project scope-related data and estimates and binding unit prices provided by tenderers and shares of overhead. The procedure proceeds mainly as follows (cf. Figure 3):

- As the procurement process starts, the owner has a transport infrastructure plan that describes the project and a corresponding tentative bill of quantities. The quantities involve uncertainty, but even though they get more accurate as design proceeds, the changes are so minor that they have no real impact on unit prices. Tenderers submit unit prices for selected items in the owner's bill of quantities which allows determining the structural-element and work-type costs of each tenderer by multiplying unit prices by quantities.

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<sup>26</sup> The final allotments of companies also depend on the success of the project in qualitative profit areas which are, however, not dealt with in this chapter focusing on costs (see Ch. 5).

<sup>27</sup> Cf. Public Procurement Act (Laki... 2007; also: Directive 2004).

<sup>28</sup> The cost level is referred to as a tender price although the tenderer has not literally committed to all items used to calculate it. The cost level is calculated to allow comparison, but e.g. "reference/comparison price" has assumed another meaning in Finnish procurement practice.

- In the typical transport infrastructure project a relatively small share of the cost items accounts for the bulk of the costs – paraphrasing an old saying: 20 % of the items can be responsible for 80 % of the costs. Thus, in order to make the work load of tenderers reasonable, it is appropriate to focus on that key 20 % of the items in tender planning and competitive tendering, for which binding unit prices are requested. In selection, the remaining items are assumed to be equal for all tenderers.
- The costs of design and site administration are estimated as the product of the person-hours of work and the hourly rates provided by tenderers. The preliminary amounts of person-hours of work required by, for instance, different competence classes (charge classes) and design disciplines are estimated by the owner. Tenderers comment on the estimates in workshops, after which the owner should fix the estimated amount of work to be used in tender price calculation. Then, tenderers submit their own binding bases of charging as part of their tender.
- The so-called other joint site costs are divided into a fixed and a time-bound component, so that the fixed component includes one-off cost items not related to time of need (utilities, start-up, dismantling, etc.) also as concerns certain some time-bound items. The fixed component is generally an item estimated jointly for all competitors. Thus, the tender includes only certain monthly prices that can be converted into tender price components on the basis of site-phase durations common to all which are determined in workshops the same way as person-hours of work estimates.
- Construction projects often include components that the owner will implement later as separate procurements, which means that they are not part of the alliance contract, but the alliance actually has the responsibility of coordinating the works (e.g. road project telematics and railway safety systems). That means costs to the alliance and, therefore, the owner must define the items already in connection with implementer selection, for instance, by announcing that it is prepared to spend a certain amount according to a plan to be made later (item: other structural elements and reservations).
- Companies' overheads, such as costs of central administration, risk reserves and margin are not included in the above mentioned direct costs. Therefore, tenders must also include binding overhead rates which are used in calculating the overall tender price and, in the case of the selected consortium, also in implementation. Overhead rates are provided separately for design and construction. The rates for construction may differ in the case of the actual contract and separate procurements.<sup>29</sup>

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<sup>29</sup> If necessary, a similar procedure can be agreed for design as concerns known works of special designers/sub-consultants although the issue has not been separately brought up here (in Figure 3).

The structure of the tender price calculation is illustrated in Figure 3 where each boxed section specifies the previous upper-level concept. *Italicised (green)* cost items are binding prices<sup>30</sup> offered by tenderers on condition that the later total price calculated using them and the quantity and scope data of designs that become more accurate also bind the tenderers. The items in **bold (brown)** are tentative estimates common to all determined, for instance, on the basis of selection workshops' suggestions. *Bold italic text (blue)* denotes tentative tender-phase quantity data calculated on the basis of the owner's designs which are also common to all tenderers.

Table 9 presents the grounds for using the built calculation model. The calculated tender price is considered in implementer selection as explained in more detail in Chapter 3.2. The time of fixing the price level and possible indexation principle must, naturally, be defined before tenders are submitted (cf. Ch. 4.5).

### 4.3 Target cost determination

The idea of an alliance-type project process is to bring the actors together to develop the project way before the design solutions and cost targets and corresponding payment bases are fixed finally. It is also assumed that design and implementation solutions improve as a consequence of the cooperation and that a reasonable target cost is below the earlier tender price – or more accurately – its revised equivalent.

The revised cost estimate is made on the basis of development-phase designs and it is, again, natural to use the simulation method, that takes into account uncertainty, already applied by the owner in budget planning (see Ch. 4.1). As design proceeds and solutions become more concrete, it can be assumed that total cost distribution and the corresponding cumulative cost curve mainly fall within a narrower range. That also facilitates setting a reasonable target cost. The following statements can be made regarding the nature and tightness of the target cost:

- The target cost must correspond to the best level of the industry and be challenging since already at that level the service provider's reward is higher than normal due to the used payment mechanism which means that pricing should not be based on a similar price level as, for example, when offering fixed-price contracts.

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<sup>30</sup> During the development of the system, it was pondered whether tenders should be made on the basis of unit costs or input costs as concerns structural-element and work-type costs. Input costs could be assumed to be a sensible choice when design is in progress and it may be difficult to commit to reasonable unit costs. On the other hand, input costs derive partly from e.g. collective agreements which makes competition questionable. An at least as important factor is that the input prices of machinery are not known, and the tender inviter cannot even know what type of equipment each tenderer plans to use to do its work. There are also such big differences between the input structures of various projects that there would be no certainty that the calculation would forecast the project's total prices with sufficient accuracy. Therefore, the calculated tender price is based on using the unit prices of the structures provided by tenderers.

## DESIGN COSTS

### Design labour costs

- + Charge class 1: **estimated no. of hrs [h]** x *hourly rate [€/h]*
- + ....
- + Charge class n: **estimated no. of hrs [h]** x *hourly rate [€/h]*

× *Designer's overhead factor [1 + overhead %]*

## + CONSTRUCTION COSTS

### Basic element of site costs (own labour + normal subcontracting)

#### Breakdown of costs by structural elements and/or work types

##### Priced bill of quantities for key items

- + Structural element 1: **amount [units]** x *unit price [€/unit]*
- + ...
- + Structural element n: **amount [units]** x *unit price [€/unit]*

+ **Total cost estimate for other items**

#### + Joint site costs

##### Site administration costs

- + Charge class 1: **estimated no. of hrs [h]** x *hourly rate [€/h]*
- + ....
- + Charge class n: **estimated no. of hrs [h]** x *hourly rate [€/h]*

+ Other joint site costs

##### Time-bound costs

- + Cost item 1: **time required [mos]** x *monthly price [€/mo]*
- + ...
- + Cost item n: **time required [mos]** x *monthly price [€/mo]*

+ **Fixed non-time-bound costs**

× *Contractor's overhead factor for "own labour" [1 + overhead %]*

+ **Other structural elements and reservations**

× *Contractor's overhead factor for "separate procurements" [1 + overhead %]*

Figure 3. Structure of tender price calculation.

*Table 9. Grounds for using calculated tender price as a basis of selection.*

### **Significance of early selection**

According to definition, project alliance is a project delivery method based on a contract between all the key actors of a project which they implement through a joint project organisation sharing the risks. Its aim is to integrate know-how and increase cooperation for the benefit of the project.

The present view is that innovations are born at the interfaces of different types of expertise while systemic innovations significant for the whole require general expertise that, in practice, can only be acquired by integrating different types of expertise.

Although the goal of integrating expertise as such does not imply the time of starting cooperation, it is clear that cooperation that begins early enough with respect to design creates the best possibilities for utilising the partners' expertise in seeking better than conventional solutions.

### **Necessity of competition**

Competitive tendering has been generally recognised as a good method of ensuring the economy of a service and increasing innovativeness when they are used as selection criteria. In the case of a major public procurement, it is also the statutory method of implementing a procurement. While either price or overall economic advantage are generally the selection criteria, it is clear that only the latter comes into question when selecting actors early in the project.

In assessing overall economic advantage, the price of an alternative must be considered in addition to related quality factors. An estimate based on the best existing view on project scope and service features must be acceptable as the price. That price is assumed to be a sufficiently accurate estimate of the actual price if it is based primarily on elements binding on the competitors which determine the final price as the scope of the project becomes more accurate as it moves ahead.

### **Integration of views**

It is a known fact that as a project proceeds, the chance of influencing its features and costs decreases while the certainty of costs increases. Integration of relatively early implementer selection and competition involving price elements is thus a sort of compromise between these views, especially if tendering is kept "light": it should be possible to determine costs relatively dependably, but the intention is not to have tenderers do the design.

An attempt is made to meet this challenge by basing the calculated tender price on both given, ultimately owner-defined cost estimate items and tenderers unit cost and overhead data – only the necessary price formation elements are fixed while the project scope has not yet been fully established.

On the other hand, these price elements only define a certain maximum price for the project; the target cost will be determined later as design progresses. It is also essential that there are genuine incentives for lowering the target cost even after signing the contract when the tender is not assumed to be absolutely "tight". The varying definition of cost overrun and underrun allotment percentages (use of the so-called two-price system) makes that possible.

### **Detailed justifications**

Basing the calculated tender price partly on cost items common to all, estimated for selection, is justified to facilitate tendering in a project that involves uncertainty and where the risk reserves included in tenders would otherwise be significant.

For instance certain total worked hours in design and site administration are estimated for the calculation of tender price also to avoid competition on total price and thereby on undermanning of the project as well as direct and uncritical use of conventional design solutions. Such competition would be highly dangerous in a project involving a lot of uncertainty where design is incomplete, and the express aim is to invest and reserve resources for cooperation in order to reach the special objectives of the project.

On the other hand, in project alliance which emphasises cooperation and development orientation, implementer selection is based on estimated advantage which stresses organisational factors. The tenderers capacity for developing the project carries much weight in selection. Proving and evaluating that is a challenging and time-consuming task. To focus attention on the ideation and development of possible new solutions, an attempt is made to keep the pricing procedure light.

Disclosure and use of overhead rates is also part of the solution that flexibly takes into account the price, person-hour and scope data that get more accurate and change as the project moves on.



- When using a procedure that considers uncertainty, the target cost level should normally be set between the median (P50) and the mean cost.<sup>31</sup> If that is found too risky, it is obvious that the parties aim to fix the target level too early, and that design to lower risks should be continued.
- In connection with setting the target cost, the parties are to specify in writing their common view on what changes the target cost and what is normal revision and development of designs which has no effect on the target cost. The starting point are the tentative guidelines prepared already at the procurement phase (see Ch. 4.5).

The other elements of the straightforward payment basis solution are also to be defined during the alliance development phase. The allotment percentages of cost overruns and underruns disclosed by the owner already as part of the competition programme data as well as the revised tender price and effects of qualitative profit areas on payments belong to them:

- Tender price is revised to match the current designs. Calculations are based on unit and hourly rates and overhead rates presented by actors already in their tenders, and only quantity data and estimates common to all tenderers are updated as to design changes and owner's work. Development of implementation solutions must not affect the values used in calculations. The result is a so-called revised tender price.
- Target levels of qualitative profit areas are defined and corresponding indicators developed.<sup>32</sup> The mechanisms by which results are tied to the payment basis solution are decided at the same time – whether jointly or separately and to which sums. The mutual weighting of different profit areas in calculating total value is to be defined in joint systems. Solutions are to be developed in the spirit of the principles suggested by the owner in the call for tenders.

Table 10 strives to outline the structure and connections between different cost-estimate levels and phases, especially the grounds for revising the tender price.<sup>33</sup>

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<sup>31</sup> When using a payment basis solution where target cost overruns and underruns are shared 50/50 between the owner and the companies (without utilising in the definition model the so-called revised tender price which, if underrun, brings a reward and affects allotment ratios), it is recommended to choose a target cost level between the median (P50) and mean cost (Ross 2006). The two-price level based system developed as part of this work differs from the presented one, but the prerequisites for evaluating possible deviating recommendations did not exist at this phase of model development.

<sup>32</sup> Qualitative profit areas are dealt with in general in Chapter 5.

<sup>33</sup> The table only deals with the principles of calculating items. The structure of the calculation is explained in Figure 3. The item “other structural elements and reservations” is not dealt with here either: it is a cost item disclosed by the owner which may become more accurate by the target-cost phase or may remain a reservation.

Table 10: Part 1 of 2. Cost and price estimates at different phases.

Cost item	Tender price (calculated)	Revised tender price	Target cost estimate
<b>OWNER</b>			
<b>A. Owner's direct alliance costs</b>			
Owner's alliance tasks (i.e. tasks performed by owner for alliance organisation included in target costs)	Differences in content of tasks between competing consortia are generally neither significant nor foreseeable; thus <i>they are not considered in the comparison of tenders</i> (they can be, if necessary)	The owner's alliance costs that became more accurate in the development phase are considered, and said item is <i>included in the revised tender price</i> along with service providers revised cost items	Same as previous  (Item is included in target cost estimate to the extent that it increases the tender price during its revision phase)
<b>DESIGNER</b>			
<b>B. Designer's overhead</b>			
Companies' overhead, risk and margin  Securities and liability insurance  Company and/or central administration	Tender discloses <i>percentage</i> of design costs (Item C) that is added to cost estimate	Same as previous	Same as previous
<b>C. Direct cost of design</b>			
Design salaries incl. social security costs (indirect employee costs)	Direct cost of design is calculated using the <i>work load estimate</i> common to all and (charge class-based) hourly rates provided separately by each tenderer	Direct cost of design is calculated using a revised work load estimate that considers <i>changes in designs</i> (scope, etc.) and hourly rates of tender	<sup>*)</sup> Direct cost of design is calculated using a work load estimate that considers <i>changes in designs</i> (scope, etc.) and <i>development</i> (new and better ideas) and hourly rates of tender
<b>CONTRACTOR</b>			
<b>D. Contractor's overhead</b>			
Companies' overhead, risk and margin  Securities and liability insurance  Company and office management  Costs of central administration's managerial and project staff	Tender discloses <i>percentage</i> of the sum of costs of items E, F and G that is added to cost estimate	Same as previous	Same as previous

Table 10: Part 2 of 2. Cost and price estimates at different phases .

Cost item	Tender price (calculated)	Revised tender price	Target cost estimate
<b>E. Site administration costs</b>			
Site management and administration tasks, measurements	Total cost of site administration is calculated using <i>work load estimate</i> common to all and (charge class-based) hourly rates provided separately by each tenderer	Total cost of site administration is calculated using a revised work load estimate that considers <i>changes in designs</i> (scope, etc.) and hourly rates of tender	* <sup>1</sup> ) Total cost of site administration is calculated using a work load estimate that considers <i>changes in designs</i> (scope, etc.) and <i>development</i> (new and better ideas) and hourly rates of tender
<b>F. Other joint site costs</b>			
Site office costs, electrification, telecommunications	Time-bound costs are calculated using <i>durations common to all</i> and monthly costs provided by each tenderer separately	Time-bound costs are calculated using durations that consider <i>changes in designs</i> (scope, etc.) and monthly costs of the tender	* <sup>1</sup> ) Time-bound costs are calculated using durations that consider <i>changes in designs</i> (scope, etc.) and <i>development</i> (new and better ideas) and monthly costs of the tender
Storage, small equipment			
Site work safety and work-safety equipment, insurances	The fixed component is considered an estimated item of the same size for all competitors	The fixed component: a revised item that considers the current situation	* <sup>1</sup> ) The fixed component: as in rest of target cost calculation
Notification, traffic control during construction			
<b>G. Structural element and work type costs</b>			
Costs of performing work	The bulk of the work costs is calculated using the estimated quantity of structural elements <i>common to all</i> of the road plan and unit costs provided by tenderers	The bulk of the work costs is calculated using the estimated quantity that considers the fact that <i>designs become more accurate</i> (scope, etc.) and unit costs of the tender	* <sup>1</sup> ) Total work costs are calculated using estimated quantity that considers <i>changes in designs</i> (scope, etc.) and <i>development</i> (new and better ideas) and unit costs of the tender
Work machinery and equipment			
Subcontracts entered into and services acquired for the project	The remainder is considered an estimated item of the same size for all competitors	The remainder is a revised item that considers the current situation	
<p>*<sup>1</sup>) In practice, the estimate is made merely on the basis of the designs and plans created during the development phase and the current cost assumption. Tender prices as such are not analysed, but limit values within which total costs should stay can be derived from them.</p>			

## 4.4 Fixing of payment bases

The development phase of the alliance ends with the fixing of the target cost. That concretises the payment basis solution, and the allotments of service providers get explicitly defined at all cost-performance levels. For one, the solution is based on the so-called *revised tender price*, *target cost* and *allotment percentages*.<sup>34</sup> Moreover, payment is influenced by the revision of the “basic amount” of the allotment defined here on the basis of costs according the performances of profit areas, but the revision is not dealt with here. The reader is just referred to the examples of Chapter 5.

The basic assumption is that target cost is lower than the revised tender price.<sup>35</sup> If that is not the case, or the difference compared to the cost level of the project is marginal, the actors may agree that the basic target cost underrun and overrun allotment percentages are valid: in the case of the owner and service providers 50/50. On the other hand, if the target cost is essentially lower than the revised tender price, that at least justifies adopting the following solution (Figure 4):

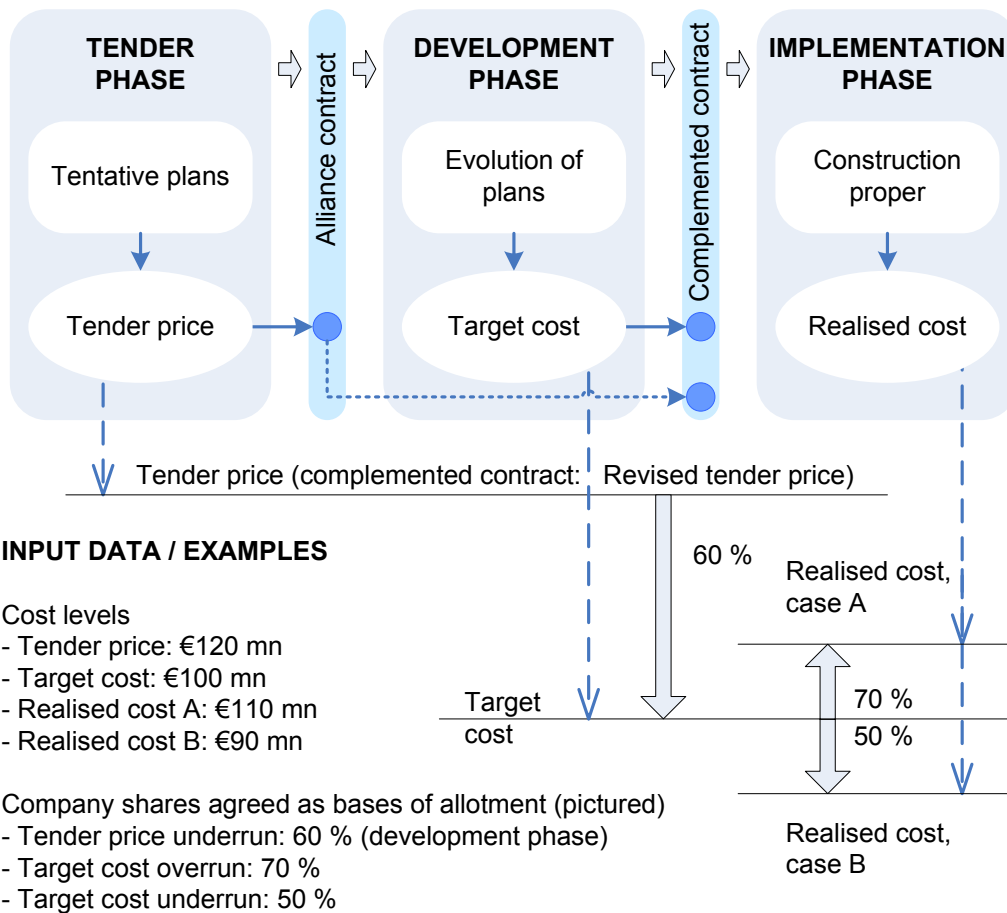
- Sixty per cent of the difference between the tender and target cost is reserved for service providers. The share is large in order to spur the actors to seek economical solutions (and a “tight” target cost) already at the development phase. Then the chance to influence project costs is greater than during the implementation phase when relatively little development potential exists as solutions are largely fixed.
- When realised cost exceeds target cost, service providers bear 70 % of the cost overrun. The share is intentionally bigger than the benefit derived from a tight target cost (said 60 % of the difference) to make service providers genuinely responsible for the appropriate size of the target cost instead of just setting an overly optimistic target to increase profit.
- Service providers’ share of a target cost underrun is 50 % according to the original allotment ratio. Although their share of the overrun is greater, their share of the underrun should not be changed in order to keep to the model based on shared risk. A smaller (< 60 %) share of an underrun is also necessary to emphasise development-phase design: that makes lowering of target cost the primary means of increasing bonus potential.

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<sup>34</sup> In addition to conditions defined by these, other conditions can also be agreed case-specifically. In some instance it may be justified to agree that companies are compensated for so-called direct costs also when the payment basis solution would otherwise limit their payment. A so-called maximum price can also be agreed for payments – costs above it are not compensated (with the exception of design changes).

<sup>35</sup> More cost-effective solutions are developed as design proceeds while designs/plans that become more accurate decrease risk reserves. Thus, it is justified to assume that the target cost generally is lower than the revised tender price. On the other hand, the target cost cannot exceed the revised tender price, either. The latter is the price at which the tenderer has undertaken to implement the project (considering the payment mechanism) which becomes the target cost unless preconditions for a lower target exist.

- Allotment models known to actors (alternative single- and two-price models)
- Tender prices determined by selection; recorded in contract
- Target cost resulting from development phase is recorded in contract; tender price is revised
- Used allotment model is chosen (two-price model in the example)
- Realised cost corresponding to the target cost calculation is computed after project's completion
- Companies' allotments are calculated



#### EXAMPLE CALCULATION 1: Realised cost A

- Bonus effect:  $60\% * [€120 \text{ mn (tender price)} - €100 \text{ mn (target cost)}] - 70\% * [€110 \text{ mn (realised cost)} - €100 \text{ mn (target cost)}] = €5 \text{ mn}$

- Payment to companies: €110 mn (realised cost) + €5 mn (bonus effect) = €115 mn

#### EXAMPLE CALCULATION 2: Realised cost B

- Bonus effect:  $60\% * [€120 \text{ mn (tender price)} - €100 \text{ mn (target cost)}] + 50\% * [€100 \text{ mn (target cost)} - €90 \text{ mn (realised cost)}] = €17 \text{ mn}$

- Payment to companies: €90 mn (realised cost) + €17 mn (bonus effect) = €107 mn

Figure 4. Cost engineering and its evolution into a payment basis system.

Allotment percentages can naturally differ slightly from those presented, but the mutual order of magnitude of the figures is essential when aiming to achieve the desired incentive effect. It is also not appropriate to increase company allotments, in order to adhere sufficiently to the risk sharing principle of project alliance.

Figure 5 illustrates the functioning of the payment basis solution with the two cost limit values (so-called *two-price model*) using the allotments based on the above percentages. In the example, the consortium has been selected on the basis of a price that becomes, as revised at the end of the development phase, the revised tender price of 100. The three examples presented as alternatives illustrate the impact of the magnitude (and tightness) of the target cost on payments to companies at different cost-performance levels (excluding the impact of quality factors): target-cost levels 96, 92 and 88. Thus, by a lower target cost level companies increase their bonus potential at the performance level in question and better ones, but correspondingly take upon themselves a larger share of cost overruns. Quite large bonuses are justified since they are based on an already competed price.

Table 11, again, explains how the total share of payments to companies is divided between them. In that connection it is essential to recognise the significance of the designer for the success of the project. Otherwise, all the reasoning does not lead to unambiguous truths.

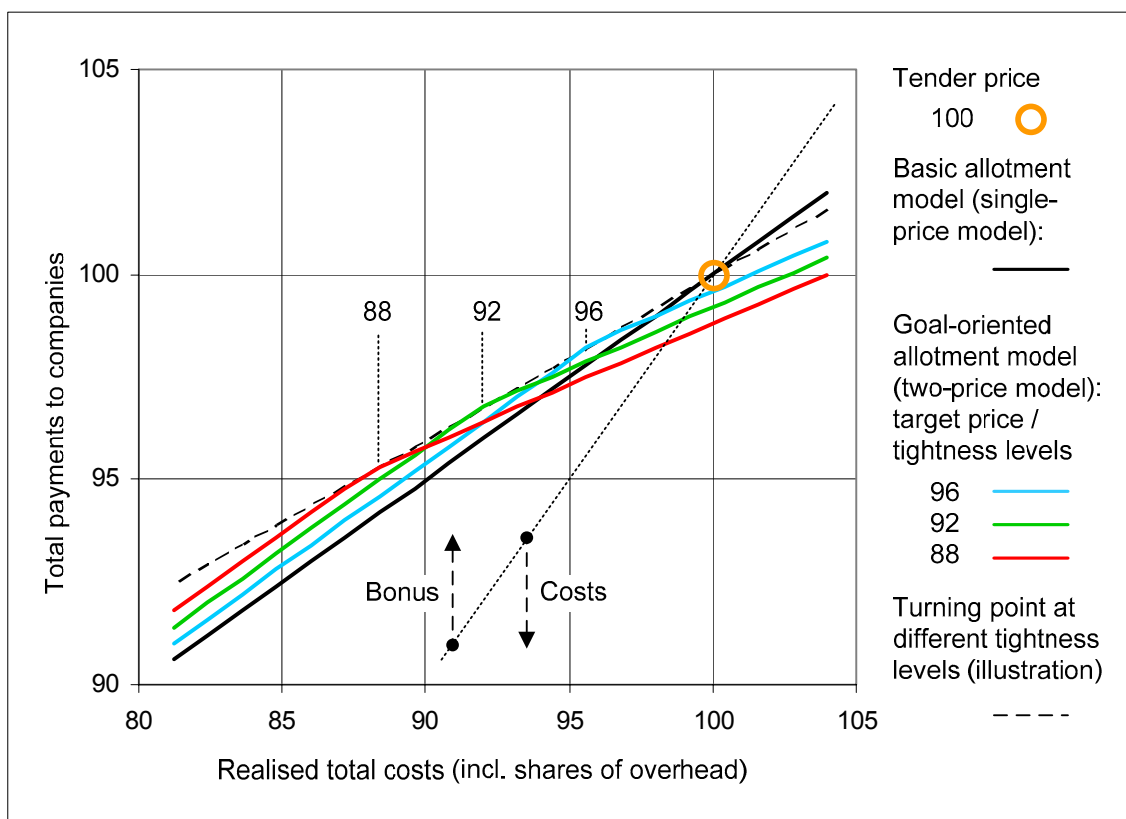


Figure 5. Payments to companies at various target-cost levels.

*Table 11. Determination of consortium companies' allotments.*

To determine the service payments earned by alliance companies, their combined share vis-à-vis the owner is calculated first on the basis of the realised total cost and the bonus effect of qualitative profit areas. Only then is the joint share of the companies divided between them.

The realisation of the project's goals does not affect the mutual shares of the companies but allotment can be made on other bases; it can be made e.g. on the basis of a company's share of the companies' joint project costs or a derivative of it. Moreover, maximum shares can be limited.

#### **Definition of basic allotments**

In Australia the relative shares of realised overheads have been used to calculate allotments (Ross 2006). Yet, it should be noted that Australian and Finnish cost accounting practices probably differ, which makes comparison of the shares of overheads impossible. On the other hand, overheads are derivatives of direct costs, which is why total costs yield nearly the same result although with different factors and revisions.

Use of overhead shares might be justified by the fact that the model outlined in this work allows defining different overhead rates for the designer and the contractor depending on whether self-implementation or separate procurements is at issue. However, even this procedure does not necessarily make the actors work for the good of the project, but might lead to inflexible project implementation as to division of tasks. On the other hand, the problem is probably mainly theoretical as the owner basically defines the content of the contract.

An alternative basis for defining the allotments of companies is the monetary value of their business as a proportion of the companies' joint business in the alliance project in question, which is used here. Then we are speaking of a typical share of about 5 % for the designer with the remaining 95 % going to the contractor.

#### **Consideration of realised costs in allotment**

Another essential question is whether the allotments of companies are determined on the basis of the shares of the target cost calculation or whether corresponding realised costs are used in allotment.

If allotments are fixed already during target cost definition, and realised costs no longer affect them, the model emphasises the sharing of risks – e.g.

should the actors see fit, more could be invested in design than earlier planned, and higher costs of design in the case of a problem project would not mean failed design that needs to be "punished". The benefit or bonus to the actor is not proportional to the party's own performance level – that is what the alliance in principle wants to avoid.

Then again, the model can be seen as similar to traditional procurement methods since the bonus setting is locked before implementation which may also be against the spirit of alliancing. A better alternative might be to calculate allotments on the basis of partners' realised costs. They represent input in the project, and it is only logical to think that the partners contribute to the success of the project in proportion to their input. The changes in execution will thus be considered in the allotments.

The model may be open to criticism in that it allows companies to "adjust" their own costs in their favour. Yet, since design and construction are primarily implemented at different times, only the contractor would have that possibility. On the other hand, the contractor's larger allotment makes such manoeuvring unprofitable.

#### **Revision and limitation of allotments**

The general view is that the designer's impact on project costs is greater than its share of the business. Australian projects have sometimes endeavoured to revise the designer's allotment by applying a factor of e.g. 1.5 in relation to savings (Ross 2006) although the calculation procedure based on overheads would appear as such to make its share twice that of its share of the business. With the allocation model based on business share even bigger factors than the presented one can, therefore, be justified. A corresponding factor has not generally been applied to cost overruns.

On the other hand, the risk bearing capacity of consultants is limited, and it may be impossible to get designers to join in the alliance arrangements unless their share of cost overruns is limited, in addition to a certain percentage, to e.g. a maximum monetary amount. The general conditions of contract (RT 13-10574 1995) already limit the designer's liability for its errors or negligence to a maximum of the total reward of the contracting party. At least the same, or even a clearly lower restriction clause, can be applied here.

## 4.5 Implementation and warranty phases

Project alliance is a procurement method based on joint development and risk sharing which means that minor design changes or changes in quantities do not give cause to change the target cost as easily as, for instance, in the case of traditional lump-sum procurement methods. Yet, the target cost sum is to be adjusted to take into account significant design changes. Changes in scope of designs can be distinguished from regular development, for instance, according to the principles of Table 12.

Another group possible requiring adjustment of target cost consists of such (positive and negative) risks whose realisation the alliance cannot influence or be reasonably expected to be prepared for. They should usually include a change in input costs – generally a cost increase. The target cost can be tied to the Cost Index of Civil Engineering Works on certain conditions. Timber, steel, concrete and bitumen are such major cost items of transport infrastructure projects that separate indexation of their price changes may be necessary although different sources of procurement sometimes follow indices poorly.

The price of major cost items can also be indexed in relation to “realised and planned cost”, but then the procurement principles must be pre-specified in the plan in order to preserve the implementing organisation’s incentive for efficient activity. Fuels are a major cost item in geographically spread transport infrastructure projects and as such a possible target of indexation on the basis of parameters.

Indexation must be explicit in all instances unless cost increases are assumed to be considered entirely in tenders and/or target costs. This procedure would transfer more risk than intended to service providers and would require further planning and risk reserves. Consequently, it is unlikely to be the preferred procedure in project alliance. A sudden economic swing might kill the developed incentive solutions.

Otherwise, the implementation-phase cost engineering of an alliance project follows traditional procedures – although complemented by the principle of openness and joint decision making. On completion of the project, payments are adjusted according to the payment basis used. Since the alliance partners remain collectively responsible for any possible deficiencies and quality defects, there is reason to agree on the portion of the payments to be set aside as a warranty guarantee for the owner. Only after the end of warranty period are the payments adjusted finally. Then, any possible costs of warranty work are considered costs of the project alliance.



Table 12. Treatment of deviations and adjustment of target price.<sup>36</sup>

<p><b>Collective risk sharing</b></p> <p>The partners bear collectively all risks related to the carrying out of a project of the agreed scope and content based on the alliance contract independent of whether:</p> <ul style="list-style-type: none"> <li>• said risks can be controlled by the partners, or</li> <li>• whether they could reasonably have been expected to be predicted.</li> </ul> <p>Collective bearing of risks does not, however, extend to risks itemised in the contract which have been specifically agreed to be borne by the owner.</p> <p>Alliance-related risks are allocated between the partners on the basis of a results-based payment basis model. That means that many situations which would be considered deviations in a traditional contract are not deviations in project alliance – just part of overall project implementation. The tender and to some extent also the target cost estimate must include risk reserves in keeping with the presumption of this comprehensive risk.</p> <p><b>Deviations</b></p> <p>In connection with an alliance, deviation refers to a situation where the partners at the alliance’s management-group level agree that the target cost or other factors affecting contract payments should be changed. When a direct cost item (work performance, procurement) is adjusted, the same change is automatically made to the target price when applying percent-based compensation of overheads.</p> <p>Cases treated as deviations include e.g. ones where the owner wishes to</p> <ul style="list-style-type: none"> <li>• include major <i>additional works</i> in the implementation which have not been considered part of alliance works or <i>eliminate</i> some planned works, or</li> <li>• alter some basic <i>design parameters</i> or <i>operational requirements</i> of the project.</li> </ul> <p>In such instances, a mechanism that adjusts the target cost and qualitative goals up or down is needed despite the fact that direct costs are in principle always compensated whether the special conditions constitute a deviation or not.</p> <p><b>Identification of deviations</b></p> <p>It is essential that the partners form a uniform view on the alliance and project management group-</p>	<p>levels of the principles that define the existence of a possible deviation.</p> <p>The following process has been successfully used to create a common understanding of what is a change that affects target price and what is development of solutions within project alliance:</p> <ul style="list-style-type: none"> <li>• The groups compile a list of possible unplanned events in implementation: e.g. 30–40 items.</li> <li>• Each group member presents his/her view on whether the event is a “deviation”.</li> <li>• The results are compiled on a single sheet and the uniformity and differences between views are illustrated.</li> <li>• The partners conduct a workshop that takes a clear stand on each item which produces the “preliminary guidelines”.</li> <li>• The guidelines are used to calculate the target price (which risks are to be included and which compensated separately as they are realised).</li> <li>• A revision workshop is held before fixing the target price which produces the “final guidelines”.</li> </ul> <p><b>Practical considerations</b></p> <p>The guideline for deviations is not assumed to be part of the alliance contract but is an informal and suggestive guideline for participants. In practice, the project’s management group makes its change-interpretation recommendation, and the management group its related decision based on the guideline. The guideline also serves as a means of communicating the interpretation to newcomers as personnel is rotated.</p> <p>It should also be noted that the guidelines are assumed to change as design proceeds. Know-how increases during the alliance development phase which should be reflected in change interpretation guidelines.</p> <p>A factually similar procedure should be utilised since the preparation of the call for tenders, and especially as part of selection-phase workshops, to determine the existence of a joint tentative interpretation.</p>
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<sup>36</sup> Modified from Ross (2006).

## 5. Payments to service providers

*This chapter describes how incentive payment bases can be created for the alliance project's service providers. It looks at the use of both realised cost-performance level and qualitative goals as a payment basis. Typical qualitative goals of transport infrastructure projects are also dealt with on a general level.*

### 5.1 Qualitative goals and their measurement

The owner sets various goals for the project. In addition to producing a well performing and high quality transport infrastructure facility, the owner may place emphasis on, for instance, the minimisation of construction-period disturbances and good safety as well as quick completion of the facility. These goals are to be attained at a reasonable cost. Promotion of the goals often makes it sensible to tie their realisation to the payment basis solution of project alliance, which also makes them part of the objectives of profitable business activity. Goals, their weighting, and especially the measurement procedures are, however, largely project-specific solution which is one reason why they are dealt with here only on a general level. The following profit areas should typically be considered in selecting the incentive solutions for transport infrastructure projects:<sup>37</sup>

**Traffic arrangements.** Incentive arrangements may also be used to try and minimise disturbance to the local traffic network's users and to allow maximal use of the transport infrastructure solutions during construction by closing only those sections or services that must be closed in each case. The significance of traffic control is more marked especially at repair and urban sites where work often has to be done while the construction site or part of it is in use.

- The suggestive criteria are disturbances to traffic flow or within traffic control systems, especially unplanned disturbances and accidents within the project's sphere of influence, lane closures and diversion of traffic to alternate routes, rush-hour traffic flow and minimal increase in travel time.

**Environmental impacts.** Environmental factors are receiving increasing emphasis which is why the disturbance from transport infrastructure projects to the environment,

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<sup>37</sup> In addition to the presented ones, construction projects use at least evaluation of operations by owner/expert and corresponding client feedback (from owner or user) based payment bases (Lahdenperä & Koppinen 2003). Good procedures are assumed to lead to a favourable end result which is why the procedure is used especially when the owner bears the risks, but the actor's influence on the success of the project is great. The procedure is not naturally adaptable to alliancing e.g. because the owner's representatives are part of the implementing organisation whose efficiency is improved by integrating goals and resources. The same applies to the use of a client-satisfaction indicator by the owner. Some applications may be possible in the case of user clients.

third parties and existing structures should be minimised. The environmental viewpoint stresses generation of less waste and avoidance of the spreading of harmful substances as well as pleasantness of the surroundings.

- The suggestive criteria are economic use of soil and earth materials, reusability and reuse of structures, energy economy and minimal use of machines, logistics that minimise transportation, disturbance to existing structures and nature, nuisance to surroundings of work site (noise, vibration, dirt, confusion, traffic). The basis of evaluation are the amount, scope and duration of nuisance events.

**Safety.** Construction is an accident prone sector where the direct and indirect costs of accidents are significant. Although they, as well as intangible disturbance, are difficult to measure accurately, safety issues often deservedly receive special attention as a result of the valuations of society and individuals.

- The suggestive criteria are numbers/frequencies of different types of accidents, lost person-hours of work, caused material damage (reactive criteria); tidiness and orderliness of the site and observation of safety instructions (proactive criteria). Monitoring of accidents is easy and objective, but study of work methods and conditions improves safety more.

**Time.** Incentives are most commonly used to reach cost or schedule goals. They are commonly used partly because the attainment of goals is easy to identify, but savings to society in travel time, vehicle and accident costs, etc. and the freeing of owner's resources are also key factors. However, in rail projects adherence to schedule receives emphasis when new seasonal timetables are introduced.

- The criteria are completion time, maybe complemented by intermediate goals. Alternately, accurate and up-to-date schedule projection and adherence to intermediate goals may also be a criterion (minimisation of risk of delay). A unit of time has a certain value in the case of a quick-completion incentive. Achievement of intermediate goals adds value when security is sought, but it is only realised if the project is completed on time.

**Product quality.** Project implementation always involves the possibility of producing qualitatively varying results which is why product quality can also be an incentive. Quality may be a benefit to the owner from the viewpoint of life cycle economy, by lightening the owner's project administration or by creating added value for the users of the transport infrastructure solution to be built.

- The suggestive criteria are, for instance, the conformity of the result with the quality-level descriptions of standards and the performance and feature values of the time of completion. In more subjective procedures the workability of solutions, the

length of the list of defects discovered in inspections and the time it takes to correct the defects, as well as deviations from the quality system and, especially, missing deviation reports may come into question. Undelayed and flawless introduction of the telematic solution is also an appropriate challenge.

**Relations with interest groups.** More openness is expected of public activity and projects than earlier, for instance, to improve citizens' possibilities of influencing things and to meet the needs of transport infrastructure service users. Transport infrastructure projects are also large in scope, involving many stakeholders, where efficient cooperation supports a functioning process.

- The suggestive criteria are the functioning of communication, media monitoring and the volume and nature of news reporting, response time to service requests, complaints and contacts, recognitions awarded to the project and its actors, feedback from the transport infrastructure service user survey as well as feedback from the project's and other local interest groups. The indicators may identify administrative, operational and user interest groups separately.

Goals are to be concretised into measurable indicators, so that they can be integrated into the payment basis solution. At times, it may be difficult to find indicators without deviating from the primary goal. Then, instead of objective measurement, one should consider relying on expert assessment, for instance, according to Table 13. However, concrete and objective indicators are always preferable.

## **5.2 Quality measurements as part of payment basis**

In project alliance, the outcome of project-specifically selected qualitative profit areas generally affects also the size of the compensations paid to companies as already stated several times. The following can be said about the inclusion of qualitative factors and outcome monitoring in general:

- The grounds for rewarding an excellent performance level is that its attainment brings the owner real (economic) benefit and/or it is part of the owner's societal responsibility. When considering what level of performance is worthy of being rewarded, the level should be set high enough even if the participants do not necessarily know how it can be attained. According to definition, the goals cannot even be excellent if the actors know beforehand how they can be attained.
- The owner may have planned some indicators and the rewarding system already when procurement starts. Alternately, the owner may just state the basic target levels for various profit areas in the competition programme (see Table 14). Then, it is natural to ask suggestions for indicators for these profit areas from candidates, who have passed the elimination stage, to be discussed and developed

*Table 13. Expert assessment of quality as part of payment basis.*

Measurement of quality is often difficult. In many cases development of systems measuring a given property is laborious. On the other hand, it is not certain either that developed systems always serve the realisation of the owner's project-specific goals – measurable features and the owner's perception of realisation of goals do not necessarily coincide. Thus, it may at times be necessary to measure the outcome by an expert assessment.

A demanding Australian building construction project used a so-called evaluation panel. The project was implemented as a project alliance, and at its launching the actors were convinced that project quality would be measured with the objective meters to be developed. The project and the procedure planned for its implementation were as follows (Keniger & Walker 2003):

- It was an architecturally unique project, demanding from the construction engineering viewpoint, that was also intended to become a national monument after its completion. Thus, project alliance was the natural procurement method, and the aim was to secure the quality of the outcome by incentives.
- The owner defined ten key profit areas in the call for tenders with the intention that they be developed into the alliance's quality indicators. As the project proceeded, six of them evolved into measured or assessed quality criteria that affected the reward.
- Benchmarking was to be used to assess quality while comparison levels were to be defined by the alliance itself. This was believed to guide the actors to quality-driven thinking and to create a sense of ownership of the processes and indicators perceived to be important.

Yet, as the project was launched, building of so-called hard, objective indicators was found partly infeasible

- An evaluation panel of three members that could utilise external expertise was selected to assess quality. The members were an architect/professor, an expert on activities of the facility and a management consultant with the necessary experience.
- Scoring made on site after thorough immersion in the issues, based in a certain way on expertise and insight, became practice. The indicators were further modified and adjusted as the project proceeded.

- The project's actors participated and assisted in evaluations by collecting and editing outcome data while technical experts monitored the hard indicators. Part of the meters were traditional measurement-based solutions.
- Quality factors were assessed in the middle of implementation, on completion, and a year after the hand-over of the building. In the last phase the ease of operation and maintenance were evaluated and feedback was requested from visitors to the building.

The experiences from the use of the evaluation panel were mainly good although improvements were also suggested (Keniger & Walker 2003):

- The evaluation stressed indicators that measure technical quality of work and perceived quality; less weight was given to evaluation of the process and procedures. Based on their experience, the panel would have laid even more emphasis on said quality factors.
- The evaluation panel's mode of operation was proactive. It ideated the possibilities of producing quality in a positive manner and did not just criticise reactively the work done. The work of the panel promoted quality-driven project implementation.
- Indicators were adjusted still during the project which was seen as proof of a cooperation-, development- and quality-driven culture that utilised external expertise. In fact, the system was regarded more as total quality management than a mere incentive.

Although the experiences from the evaluation panel were favourable, one should keep in mind that it was a building construction project, and quite unique as such. It is not certain that similar procedures are applicable to a transport infrastructure project.

Transport infrastructure projects are more technical by nature, i.e. they include fewer value-laden elements than building construction projects. Functionality is quite unambiguous, and impression is not as weighty a quality factor. Thus, an evaluation panel is hardly the primary solution for transport infrastructure projects where hard indicators should be used if possible. Yet, the presented procedure may generate added value in some projects, especially the use of external experts.

Table 14. Example of the presentation of project alliance's goals in call for tenders.<sup>38</sup>

Key profit area	Minimum conditions of satisfaction	Game-breaking performance
Safety	<ul style="list-style-type: none"> <li>• none of the actors gets hurt during construction</li> <li>• no members of the public get hurt because of construction</li> </ul>	<i>[not part of reward system]</i>
Quality	<ul style="list-style-type: none"> <li>• quality of work satisfies [owner's] standard specification or equivalent</li> <li>• target cost and whole of life costs are demonstrated to represent good value for money</li> </ul>	<ul style="list-style-type: none"> <li>• outstanding level of workmanship achieved</li> <li>• realised cost and whole of life costs demonstrated to represent outstanding value for money</li> </ul>
Schedule	<ul style="list-style-type: none"> <li>• project completed by [date]</li> </ul>	<ul style="list-style-type: none"> <li>• project completed by [date]</li> </ul>
Traffic operations	<p>During construction</p> <ul style="list-style-type: none"> <li>• no unplanned impact on traffic flow due to works</li> <li>• average travel times are maintained during off-peak period</li> <li>• current average travel times are not exceeded during [event]</li> </ul> <p>After construction</p> <ul style="list-style-type: none"> <li>• average travel times through interchange improved 25 %</li> </ul> <p>Public transportation</p> <ul style="list-style-type: none"> <li>• improved travel time reliability for [buses] and taxis after construction</li> </ul>	<ul style="list-style-type: none"> <li>• improved traffic flow</li> <li>• improved average travel times during off-peak period</li> <li>• improved average travel times during [event]</li> <li>• average travel times through interchange improved by 50 %</li> <li>• significantly improved travel time reliability for [buses] and taxis</li> </ul>
Interest group relations	<ul style="list-style-type: none"> <li>• good relations with key stakeholders, including [list]</li> <li>• proactive engagement with utility service owners/operators</li> </ul>	<ul style="list-style-type: none"> <li>• outstanding relations with key stakeholders, including [list]</li> </ul>
Environment and aesthetics	<ul style="list-style-type: none"> <li>• site is aesthetically pleasing during [event]</li> <li>• no reportable environmental incidents</li> <li>• hard and soft landscaping meet benchmark [reference road]</li> </ul>	<ul style="list-style-type: none"> <li>• industry awards for landscaping and architectural features</li> </ul>
Legacy of project	<ul style="list-style-type: none"> <li>• [owner] gains an increased capability to deliver major capital projects</li> </ul>	<ul style="list-style-type: none"> <li>• [owner] gains a significantly increased capability to deliver major capital projects</li> </ul>

<sup>38</sup> VicRoads (2005) – slightly modified.

in selection workshops. The indicators are finalised in cooperation during the development phase of the alliance.

- Performance indicators are monitored where possible, for instance, on a monthly basis during the project (unless the indicator only shows the outcome after the project is completed). The final outcome can be the mean of measurements or its cumulative value (e.g. recognition rewards). The factors measured during the project are communicated to the participants in real time. It should be noted that the indicators have named “owners” shown in the organisation charts.

### **5.3 Overall view of payment bases**

The payment basis solution of project alliance gets quite multidimensional. There are many reasons for that. First, the intention is to underline also the status of other factors than cost objectives by integrating them into the payment basis solution. On the other hand, the dominant guiding effect of costs is limited by sharing the cost risk. The third influencing factor is the guiding effect of the tender price while the incentive solutions are used to make service providers invest especially in joint development-phase design.

Thus, the payment basis system builds on the previously defined (revised) tender price and target cost. They are sort of fixed points (cf. Ch. 4.4) used as bases for determining various allotment percentages and payment bases in alliance projects. Generally the payment basis model evolves gradually, for instance, into a model of the type analysed in Figure 6 (model definition, calculation of compensations):

- The target cost of the project is determined by adding up the direct costs of various key partners and the companies’ overheads. Overheads include the normal reward and are calculated as a percentage of direct costs by company (separate procurements as an independent item; see Ch. 4.2) as stated by the selected service providers in their tenders. The target cost also includes the costs of the owner’s resources allocated for the alliance.
- Target cost overruns (losses) or underruns (savings) are allocated basically so that the owner’s share is 50 % and the combined share of companies is 50 % in both cases. This principle may be followed unless the target cost is successfully lowered clearly below the revised tender price during the development phase. In the shown example target cost is below tender price and the parties adopt the allotment model tied to these two cost levels.

- In this so-called goal-oriented payment basis model of two cost levels (*two-price model*), the allotment percentages vary at different cost-performance levels (for more details see Ch. 4.4) with the target cost as the limit value (in addition to a possible maximum price; not in the example). The calculation of the final total compensation is affected by the alliance's success in the qualitative profit areas in addition to cost performance provided that inclusion of these factors as payment bases has been separately agreed.
- Qualitative profit areas are provided with indicators whose performance level values are linked to certain point values (e.g. linearly from -100 to +100) or directly to monetary items.<sup>39</sup> With the scoring method, the total qualitative outcome is often calculated as a weighted average of the performance of different profit areas<sup>40</sup>, and monetary equivalents are defined for total scores. In the example, the profit areas of safety and quality inspections are taken into consideration this way.
- Completion time is an example of a quality factor for which it is sensible to define a direct monetary value based on how early or late completion is compared to the planned basic goal. This was the case also in the illustrated payment basis example. The bases in road projects are, for instance, travel time, accident and vehicle costs due to a delay. The scoring method may adapt more naturally to several other quality goals.
- The allotments between companies form in proportion to their realised business shares (i.e. the estimated shares used as a basis of the target cost are not used). Total costs are calculated on the basis of realised direct costs and overhead rates (original ones given in the tender). The allotments can be revised by different factors, and it is often natural to do so (see Table 11), although it was not done in the example.

A general assessment and views on the use of multiform incentive payment bases are presented in Table 15.

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<sup>39</sup> Ross (2006) presents as an alternate solution a procedure where the performance level of qualitative profit areas affects the allotment percentages of cost overruns and underruns. Such a procedure was not considered a first priority here, for instance, for the reason that the value added of quality is independent of the cost-performance level, whereas in a procedure that affects the percentages, the incentive effect is negated as to qualitative goals when costs are close to the target cost. Another reason was the strive for a simple solution, especially with this payment basis model tied to two cost limit values, where percentages vary anyway.

<sup>40</sup> Other methods can also be used such as paying a bonus on the basis of the outcome of the relatively weakest quality factor, or by following a certain order so that a payment based on lower criteria is never higher than one based on a more important performance criterion (Lahdenperä & Koppinen 2004). However, the weighted point procedure is recommended in most cases because it is widely known and rewards all performance measures defined as value added.



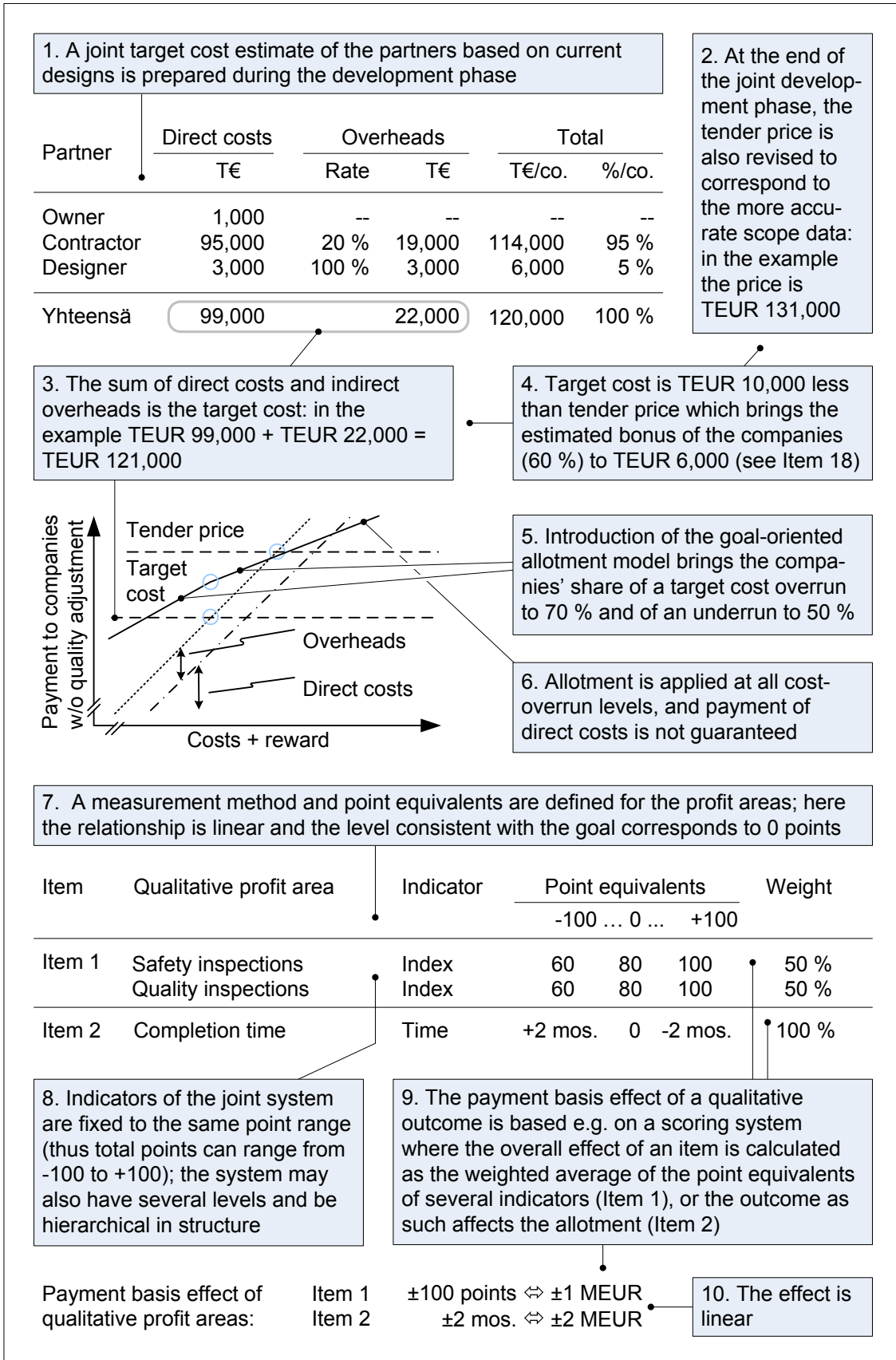


Figure 6: Part 1 of 2. Payment basis example: definition of payment basis.

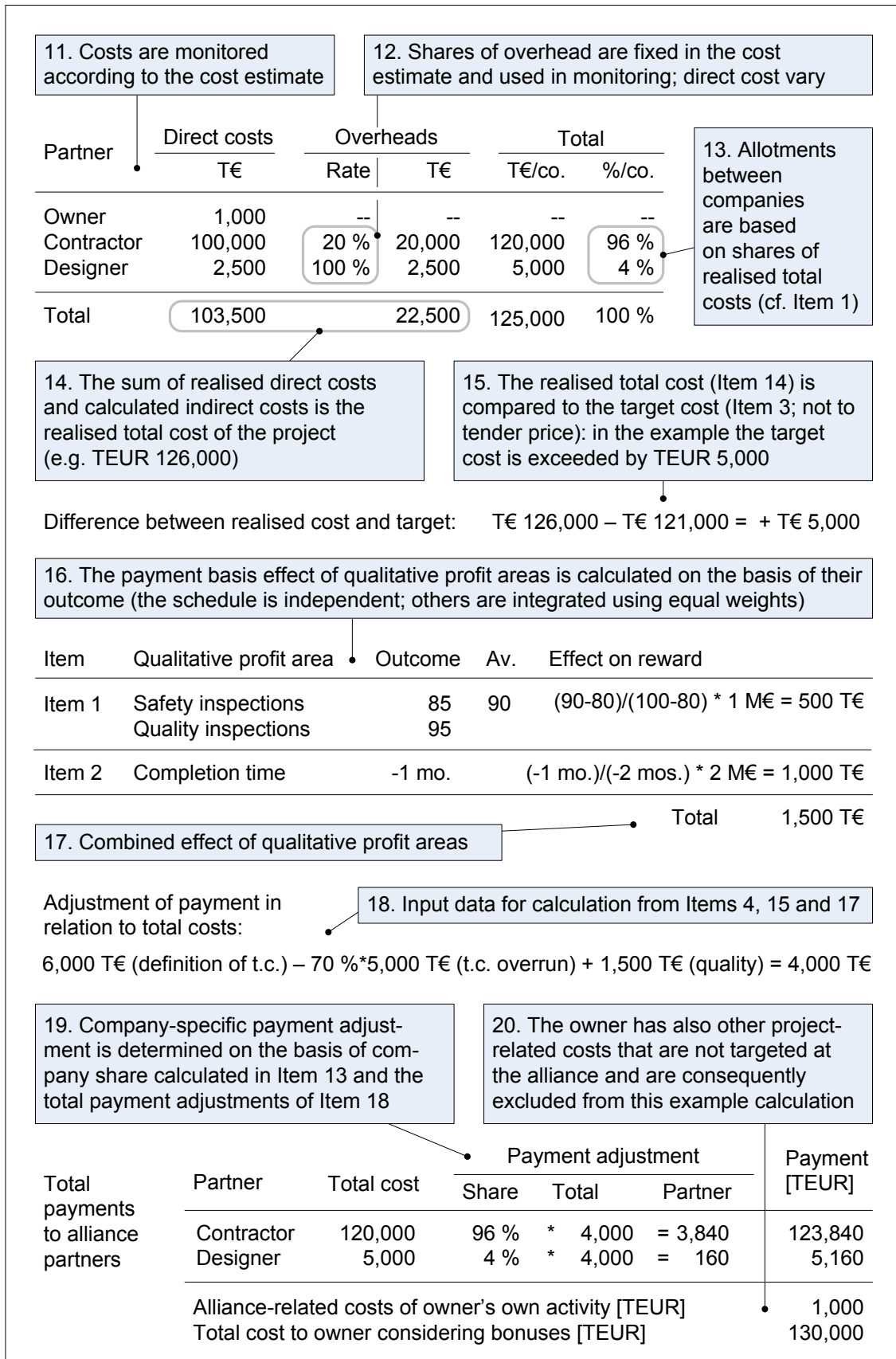


Figure 6: Part 2 of 2. Payment basis example: calculation of actual payment.

Table 15. Evaluation of possibilities and risks related to incentive payment bases.<sup>41</sup>

The aim of making the qualitative outcomes of a project payment bases for service providers is to harmonise the goals of service providers with those of the owner. The uniqueness of projects and use situations is, however, a challenge. That is why the features and functioning of incentive systems vary. The same naturally applies to any possible advantages and drawbacks of the systems which on a general level are the following:

#### Benefits and opportunities

- Incentives allow better alignment of the contracting parties' goals to serve the interests of the overall project (internalisation, motivation). They ensure also that the project goals dealt with in the beginning are not forgotten as the process moves ahead.
- Service providers may favour owners who apply incentive systems. Thereby they give preference to their projects e.g. when deciding about the allocation of their best staff among different projects.
- Incentives can be used to channel project risks to the party in key position to influence their realisation the most. The allotments and reward expectations of partners can be made to adhere to the division of liability in the contract.
- Sharing of risks and rewards makes cooperation more effective and increases communication and mutual trust. Successful creation of team spirit and an emphasis on the owner's goals motivate also the owner to promote the success of other parties.
- Incentives lead to a good work performance in a project. In problem situations they direct energies from looking for culprits to solving problems. Accusations are useless when all either benefit or suffer from the common outcome.
- More effective operation allows the parties to improve their competitiveness, profitability and returns. A satisfied owner is an excellent reference for a service provider when tendering for future projects and competing for them on the basis of competence.

- Incentive systems stress the importance of the quality of products and services. The valuation of quality work increases, and innovations make operation more effective. Due to multiplier effects, innovations further the development of the entire sector over the long term.

#### Challenges and risks

- Contract preparation requires greater application than traditional contracts. Also, the work that goes into tender preparation may increase while tender comparison may require more work from the owner than usually.
- Project monitoring and performance measurement may increase the work load (while perhaps reducing the need of other monitoring). The problem accentuates when the system gets more complicated in pursuit of objectivity; it may be difficult to find indicators.
- Especially incentive criteria based on subjective evaluations may create a credibility problem and conflict situations. Their anticipation may sometimes drive up quoted prices due to the risk to the expected reward feared by the actors.
- For incentives to be effective and meet the many goals of a customary project, a larger number of incentive elements are needed. Proper prioritisation of criteria and management of their mutual interaction may, however, prove difficult.
- "Deception" based on artificial systems that over-emphasise own interest may sometimes be a threat. Wrongly weighted bonus terms can also lure one to compromise a certain performance element to improve the outcome of another and to increase the bonus.

Although linkage of qualitative factors to the project payment basis system is basically justified, the suitability of the solution must be considered separately for each project. The presentation is intended as a general check list for the design of incentive systems. It does not provide detailed answers but emphasises the main principles revealed by an extensive survey.

<sup>41</sup> Modified from Lahdenperä & Koppinen 2004.

## 6. Administration and decision making

*This chapter presents an organisation formed by its members that is suitable for project alliance. It examines the make-up and job description of different organs of the organisation. It also ponders the division of tasks, subcontracts, special tasks of the owner and outlines the principles of the alliance contract.*

### 6.1 Organisational structure

All the key project partners are to be represented in the alliance organisation: at least the owner, general contractor and designer. More than one actor may perform said roles. Large projects call for many types of know-how and many resources which means that the alliance agreement naturally includes more than one designer and/or contractor. Alternatively, the companies performing the same role may start a joint venture that is one alliance partner. Moreover, since project alliance is primarily suited for projects involving much uncertainty, the project in question is often likely a joint project of several owner organisations. In their case, the owner organisations should also be represented in the alliance.

Based on the above, it is clear that the organisation is always project-specific and the alliance's administrative structure can only be outlined on a general level as in Figure 7.<sup>42</sup> The alliance organisation consists of the *alliance management group*, the *project management group* and rest of the *project organisation*. The alliance gets its key resources from the contracting partners: the companies and the owner. The figure also depicts the participation of the top management of the partners in decision making in the hopefully very few instances where the alliance organisation is unable to come to an agreement about how to solve matters. The actual organs of the organisation are made up as follows:

- **The Alliance Management Group (AMG)** generally includes 1–2 representatives of each partner. The group meets regularly, for instance, once a month. *The alliance project manager* acts as presenter at meetings but does not participate in decision making. The group strives for a consensus, but the members are also committed to abide by a majority decision, if necessary. Each contracting party has one vote independent of the number of representatives. A quorum requires the presence of one representative of each party. At least minutes on decisions made at each meeting are taken. Group members are expected to have leadership skills, experience and authority as well as vision. They must also be committed to the alliance. The ability to see things from the

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<sup>42</sup> The model corresponds in principle to both the administrative structure used by the sector actors involved in the development project in joint ventures and the one used in Australian project alliance (Ross 2006; groups named differently).

viewpoint of others is also a desirable characteristic while members have the permission and obligation to project the views of their own organisation.

- **The Project Management Group (PMG)** is made up of the managers of various sectors of the alliance; at least one representing each contracting partner. The group meets regularly once a week or fortnight and is chaired by the *alliance project manager*. Group members manage the design, construction, etc. work of their area of responsibility and work full-time for the project. The make-up of the group may change as implementation proceeds and the focuses of work change. In its decisions, the group should strive for unanimity, but the project manager is authorised to make decisions and take the project forward, even if consensus is not reached. However, the project manager must report major differences to the Alliance Management Group. The interest of the project guides activities, and achievement of consensus is promoted by the fact that the partners are authorised to pursue the interest of the project and forget the viewpoint of the background organisation.
- **The Project Organisation** members are appointed to serve the best interests of the project. No double roles or systems are allowed. The task of the Project Organisation is to execute the project, and each member has a clear responsibility for certain project sections and tasks. The Project Organisation operates under the Project Management Group (members), and its structure is largely dependent on the features of the project. It is an advantage if the members know each other beforehand. However, the precondition for smooth cooperation is that cliques or factions do not form within the organisation. Thus, it is essential that the project group is considered a single team that seeks the best of the project.

The alliance organisation communicates officially with owners and companies via the management group. In matters of less official nature, it also communicates directly with the project group.

## 6.2 Practical division of tasks

The alliance organisation evolves, and its tasks become more specific during project preparation, tender preparation, workshops and, finally, contract negotiations. The related role of the owner and use of sub-consultants are worth looking into on the level of main principles:

- **Use of sub-consultants** may be appropriate in carrying out some alliance tasks. For instance, it is natural to employ an external consultant for quality management and assurance and communications. It should also be possible to include a legal consultant

and a construction-period financial auditor<sup>43</sup> in the alliance make-up, if necessary. It is suggested that all parties employ the services of their own lawyers before the signing of the contract. After the founding of the alliance, an independent lawyer or one accepted by all parties is used. The same should apply to the financial auditor.

- **The owner's special tasks** are to be distinguished clearly from the obligations of the alliance. The owner may give itself one-sided authority to decide issues related to, for instance, official tasks and obligations and functional requirements relating to the transport infrastructure solution, design parameters or their range of application. The owner may also retain decision making power in relation to urgent measures needed to protect the environment or to discontinue alliance works. The owner side defines already in the call for tenders the tasks it intends to perform itself, or for which it alone is responsible. Besides them, the owner also performs alliance tasks.
- **The owner's participation** in the alliance organisation should basically involve use of own staff so that the participants have the necessary financing and decision-making authority. Should, for instance, owner's consultants participate in the work, they must work in close cooperation with the owner and have sufficient authority. Moreover, consultants must be bound to the project for its duration based on contract incentives similar to those of other service providers. Such an arrangement may come into question with the Project Management Group.<sup>44</sup> On the other hand, the Alliance Management Group must always include a member of the owner's organisation.

The owner must set clear goals for the alliance and communicate the organisational boundary conditions and plans according to which it intends to implement the project. Table 16 provides an imaginary example of the key competencies needed in an alliance organisation and the probable parties that assume liability for them in a transport infrastructure project (view of practical actors). The division of tasks between the owner and the alliance is provided already in the call for tenders.

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<sup>43</sup> In the suggested approach there is no need for the owner to hire an external consultant to conduct benchmarking for cost estimation at the selection and development phase as in the Australian approach (cf. Ross 2006). This is because the candidates compete also on the basis of tender price components, and incentives have been developed for the payment basis model to lower the target cost during the development phase.

<sup>44</sup> Although the goals of intensifying cooperation and integrating know-how do emphasise the active involvement of the owner's personnel, the ongoing renewal of owner organisations and the general tendency toward outsourcing pose a challenge to the building of alliance organisations of this type.

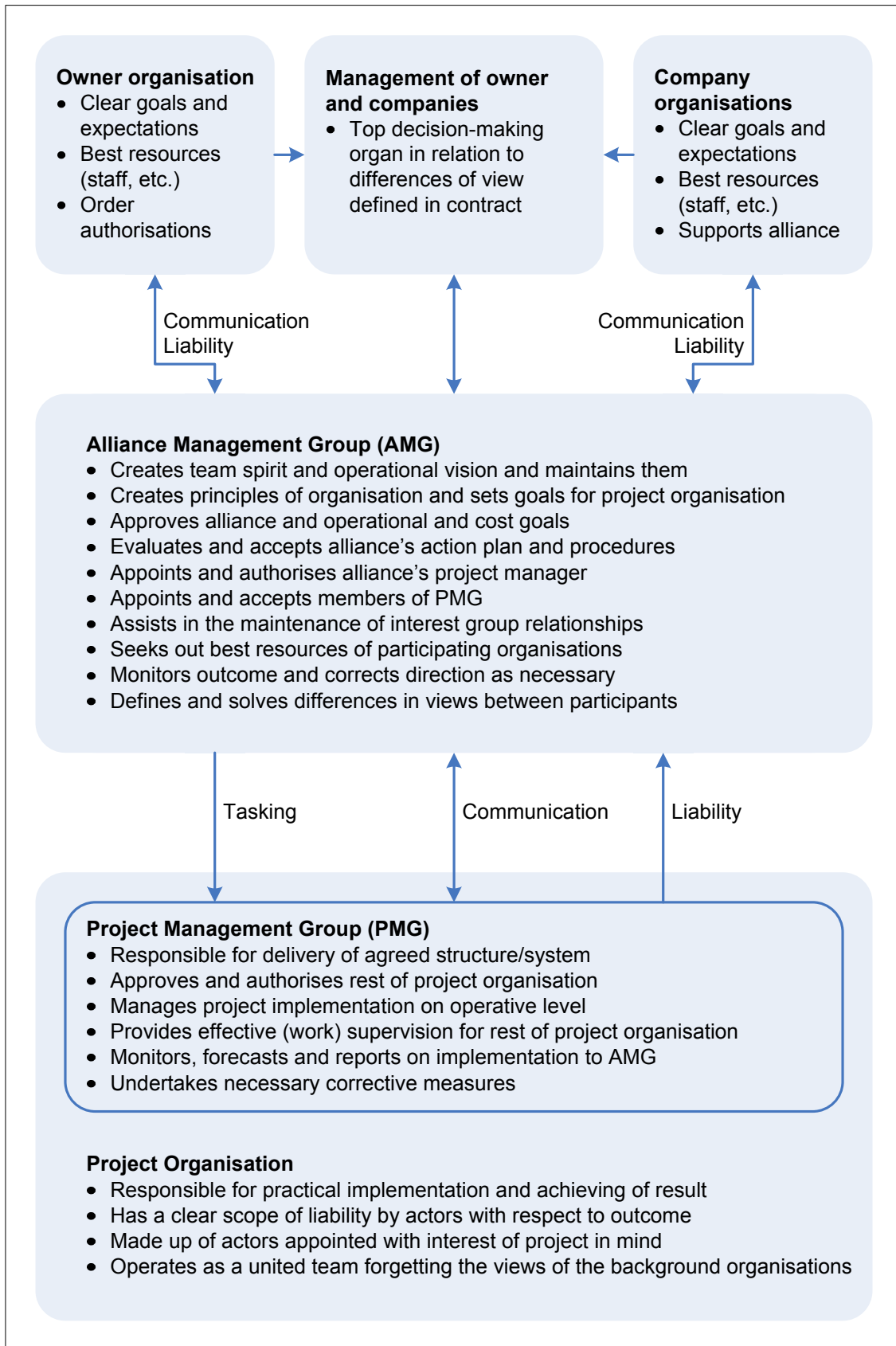


Figure 7. Alliance organisation and tasks of its different components.

Table 16. Key competencies required in an alliance and the natural responsible parties.

Competency / function	Owner <sup>(*)</sup>	Alliance partners	Possible sub-consultants <sup>(**)</sup>
Land acquisition and access to site	x		
Permit issues	x		
Design parameters, functional requirements	x		
Contacts with other parties (municipalities, etc.)	x	x	x
Communication and PR	x	x	x
Various design tasks (incl. acquisition of input data)		x	
Various tasks of construction		x	
Construction-period traffic arrangements		x	
Project management, monitoring and reporting		x	
Evaluation (e.g. financial)		x	x
Design management and coordination		x	
Environmental issues (accidents, environmental impacts)	x	x	
Noise protection		x	
Work safety		x	
Subcontracts		x	
Warranty period measures		x	
Quality management		x	x

<sup>\*)</sup> In the call for tenders the owner defines those tasks that it intends to implement outside the alliance and/or in which it retains full power of decision

<sup>\*\*)</sup> Tasks typically suitable for alliance's sub-consultant (limited external assignment) that, however, become specified only as a result of the tender and implementation process

### 6.3 Contractual issues

The administrative model of project alliance must also be defined as part of a legally binding contract which lists, for example, the expectations, rights and obligations of the contracting parties. The alliance contract differs significantly from the so far used Finnish contract solutions in that there the owner and the key service providers are now co-



producers of a structure and bear jointly the bulk of the project risks.<sup>45</sup> Thus, the alliance contract must in deviation from traditional approaches describe, for instance:<sup>46</sup>

- the management mode and method of administration, corresponding systems and rules and the method of making key decisions as well as the documentation practice
- the strive for good cooperation and resolution of conflicts through the internal organs of the alliance organisation
- the principles according to which construction-period deviations that affect set target-cost level are evaluated
- liabilities that are joint and ones that only a single party is responsible for, as well as the consequences of negligence<sup>47</sup>
- the principle and solutions of open cost accounting common to all parties as well as the principles of other common information and management systems, and
- details of the owner's payment liability at different cost levels and with different outcomes of qualitative profit areas.

Here we are dealing with an uncustomary joint contract between several parties.<sup>48</sup> There is also good reason to ask in this connection whether the contract should be written in the first person plural to emphasise the fact that the liabilities are for the most part common. Naturally, the alliance contract should be worded so that the strive for consensus decisions is not in contradiction with the legal obligations of some member. Especially the legal authority and freedom of action of a public owner must not be endangered in the alliance contract.

The alliance is unlikely to change the traditional practice of furnishing security, that is, the companies of the alliance consortium will each lodge their own security as usual.

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<sup>45</sup> Current contracts are largely based on the same known general terms of contract independent of the used procurement method. It is likely that the sharing of risks in project alliance will change many traditional terms so that e.g. the General conditions for consulting (RT 13-10574 1995) and building contracts (RT 16-10660 1998) apply to project alliance only partially.

<sup>46</sup> The list is not a comprehensive description of the differences between project alliance and traditional contractual usage. When drawing up the contract, the parties must, in principle, go through all the contractual issues in light of the new situation, which this listing certainly does not do (securities, insurances, confidentiality, liabilities for negligence, intellectual property rights (IPR), damage to third parties, discontinuation of work, bankruptcy issues, payment arrangements, etc.).

<sup>47</sup> Although many of the project solutions are decided jointly, the contractor engages the subcontractors which means that the subcontracted work is not public procurement as referred to in law.

<sup>48</sup> The statement refers primarily to the content of the contract and does not fully exclude the possibility that the contractual entity might be based partly e.g. on contentually interlinked bilateral agreements.

## 7. Applications and prerequisites for use

*This chapter takes us towards the putting into use of project alliance. The challenge is approached primarily from the viewpoint of an owner that is considering alliancing. Means of evaluating the suitability of projects for execution as project alliance are presented, and the capabilities required of the owner for a successful alliance are listed.*

### 7.1 Applications and use situations

According to the definition given at the beginning of this publication, the basic idea of project alliance is that its key actors share the project risks. This is made concrete by incentive payment bases that spur good performance. When rewards are tied to the success of the overall project, not just the outcome of each actor's own task field, the operational model brings the actors into close cooperation. Integration of different types of know-how for the promotion of common goals creates the actual force that is believed to make the alliance capable of generating added value in comparison to many other procurement methods. All-out success of cooperation does, however, require that the actors can base their cooperation on good mutual trust, commitment and active exchange of information.

Based on the above, the outcomes of most projects could naturally be expected to improve by the introduction of project alliance where risks are shared. Yet, that is not necessarily the case since there are projects that involve relatively little risk and where clear goals can be defined for each party separately. Then, risks are borne by the party that can influence their realisation, risk reserves are small, and competitive tendering makes the project economical. There the benefits of an alliance may not offset the costs of creating a heavy joint organisation.

Thus, it is evident that project alliance is first and foremost a procurement method for projects that involve a lot of challenges and uncertainty. The challenges make integration of competencies profitable. Uncertainty, and the incompleteness of design during the selection of partners, mean that the project has development potential. And that potential can now be exploited through cooperation. Thus, the appropriateness of project alliance must be assessed, for instance, on the basis of the uniqueness of a project and its inherent uncertainty. Taking that into account, Table 17<sup>49</sup> presents various factors that may favour or be against use of project alliance. The more conditions of the table apply to the project, and the more fully these factors are realised in the decision-making situation in question considering differences of degree, the more likely project alliance is to work.

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<sup>49</sup> Developed on the basis of sources ACA (1999); Scott (2001); Ross (2006); Turner and Simister (2001).

Table 17: Part 1 of 2. Evaluation of suitability of project alliance.

#	Decision factor	Alliance is unsuitable		Alliance is suitable
<b>Owner's attitude and readineses</b>				
1.	Owner organisation's attitude toward risk	According to owner's risk strategy, it is a risk avoider that seeks to transfer all risks of implementation to the other parties	↔	Owner is capable of assessing project risks and allocating them appropriately in each case
2.	Owner's knowledge of the building process	Owner is a "one-off" client, has bought projects based on integrated services or through a consultant; little knowledge of the process	↔	Owner knows building practices and can bring added value to collaborative implementation through own active input
3.	Continuity and development-orientedness of owner's operations	Owner is satisfied with prevailing practices and sector actors' independent development and sees no need to promote development	↔	Owner feels the need to develop sector and technology; active development of sector is also in owner's long-term interest
4.	Situation with personnel resources	Resources of owner's organisation are limited and the aim is to minimise participation in actual implementation of projects	↔	Owner has competent personnel able to provide a larger than normal input to project implementation
<b>Project's goals and governing factors</b>				
5.	Importance of quick project completion	Project's completion time is of relatively small importance, assuming that the project is implemented roughly on normal schedule	↔	As quick completion and handover of facility as possible are especially important in the project in question
6.	Importance of setting fixed price for project	An implementation price competed as low as possible and fixed early is a key governing factor in project's decision making	↔	Owner can be flexible with price and bear cost risk to some extent if finds it to be in its interest
7.	Goals of project and the challenge they present	The qualitative goals of the project are traditional and can be met by conventionally used solutions	↔	The project involves many important and challenging goals, and it is not certain how they can be reached
8.	Goals of project and their unambiguousness	The goals and possibilities of the project are highly ambiguous, and the owner is not yet able to communicate them unambiguously to others	↔	Definition of solutions to the goals of the project is problematic, but the vision and target level of the project are communicable to others
9.	Number of revisions expected to designs	Project requirements and solutions have been defined for overall project, and its details and no changes in them are expected	↔	Project requirements and solutions cannot be considered final and changes are expected during implementation

Table 17: Part 2 of 2. Evaluation of suitability of project alliance.

#	Decision factor	Alliance is unsuitable		Alliance is suitable
<b>Project properties and risks</b>				
10.	Size and scope of building project	Project is quite small as an investment, and the major effort required by the heavy cooperation process appears unprofitable	↔	Project is a relatively big investment, and the major effort required by the cooperation process appears profitable
11.	Project's linkages to existing infrastructure	Project is an independent new investment without major linkages and boundary conditions in relation to existing/functioning network	↔	Project will be implemented in built environment and has many critical interfaces with operational systems
12.	Project's interest groups	Project has no interest groups causing uncertainty that should be specifically considered in implementation	↔	Project's interest group relations involve great uncertainty, and interaction during project is likely to be active
13.	Project's sensitivity to cultural and environmental factors	No factors of uncertainty related to project are in sight, and/or their impact on project would be negligible	↔	Uncertainties exist in project environment that, if realised, will impact on project solutions and progress of implementation
14.	Technology utilised in project	Project will utilise known and established technology that involves hardly any development possibilities or factors of uncertainty	↔	New technology will be tested for the first time in project, or is intended to be developed during project implementation
15.	Nature of project-related risks	Risks related to project can be defined accurately and can be completely managed by some project partner	↔	Risks related to project are multidimensional and hard to define and can apparently only be managed collectively
<b>Readinesses and resources of service providers</b>				
16.	Availability of sector actors with suitable experience	Sector actors do not have good experiences and proof of cooperative implementation and/or are not eager for project alliance	↔	Sector actors have good experiences and proof of cooperative implementation and are eager for project alliance
17.	Resources needed to implement the project	Project requires special know-how and puts actors of narrow expertise in a critical position without the will to bear overall risk	↔	A few contractors and designers can naturally assume overall responsibility for implementing the works of the project
18.	Availability of potential service providers	[Several sector actors master used technology equally, and the suitability of the alliance depends on other factors]	↔	The project will rely on the technology of a certain or certain few companies adapting it to the project's special requirements

## 7.2 Readinesses and prerequisites

Defining the situations where project alliance should be used is not unambiguous. Although its use might appear justified based on the previous chapter, it may be necessary to ensure the existence of certain readinesses before making a final decision. There might also be reason to ponder these issues when the owner plans and prepares a project that has already been decided to be implemented as an alliance project. At least the following factors are worth pondering:<sup>50</sup>

### Conditions related to goals and competence

- The owner is capable of evaluating the various aspects of project risks and bear or allocate risks case-specifically, always in the most appropriate way.
- The owner wants out-of-the-ordinary, better than usual solutions for which the owner does not have distinct suggestions.
- The owner is constantly engaged in construction and guided also by long-term goals – general development of the sector is also in its interest.
- The owner knows the practices of construction and has process know-how that integrated with the services providers' know-how most likely generates added value.
- The owner considers the different qualitative dimensions of projects as important enough added values to be ready to pay for their realisation.

### Conditions related to ground rules of the activity

- The owner understands well what project alliance is, its ground rules and process, and what it requires of the owner.
- The owner is willing to accept that due to the limited risk of service providers, the owner must bear some of the risk of an unsuccessful project and cooperation.
- The owner is willing to accept an operational model intended to keep others from criticising those that cause problems and from seeking compensation from them.
- The owner organisation accepts that the price is not fixed as cooperation or construction begins, but only after construction (the warranty period) is over.
- The owner feels that selection emphasising quality and subsequent definition of target cost are not a threat to its legal and economic integrity (as a public actor).

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<sup>50</sup> The list has been compiled and modified mainly from Ross (2006; 2003a) with a few supplements.

### **Conditions related to project preparation**

- The owner has both the desire and the readiness to invest in demanding implementer-selection and team building and creation of the team's culture of cooperation.
- Assessed project risks are so significant that they would be reflected as high risk premiums (reserves) if transferred to service providers.
- The owner has conducted a detailed risk assessment on the project including preparation of a probability-based estimate of the project's costs.
- Thorough assessment of project risks indicates that project-related uncertainty is real, not related e.g. to defective design.
- The owner's view is that surprises and design changes with target-level and cost effects are to be expected as the project moves forward.

### **Conditions related to resources**

- The upper management of the owner is committed to supporting alliance-type implementation, and the culture of cooperation can be built on their leadership.
- The owner is able to appoint experienced, competent and alliance-spirited representatives to the various management groups of the alliance organisation.
- The owner has competent personnel that can also participate in the practical implementation of the project with a larger than traditional input as required.
- Commitment of the owner's representatives in the alliance organisation to implementing the alliance project does not disturb owner's other operations.
- The owner can find competent and experienced members for the evaluation panel that enjoy the confidence of sector actors and have sufficient time for the selection.

## **7.3 Summary**

The competitive project alliance presented in this publication has been developed in close cooperation with a wide expert network of practical actors. The view brought forth by the actors is that the competitive project alliance model created as a result of this work is suitable for the implementation of demanding transport infrastructure projects and appropriate for the Finnish operating environment including the legal praxis concerning public procurement. The potential benefits are believed to be large enough to make the significant investment required by its introduction worthwhile. Thus, the development continues, and the publication provides the foundation for preparing and launching the first projects to be implemented as project alliances.

The basic principles of an alliance should also be kept in mind as projects proceed in addition to the initial investment. Table 18 can be of assistance there. It is intended as a memo of the critical success factors of project alliance when considering the practicality of procedures and possible needs of revision as a project progresses. The factors listed in the table, some perhaps slightly clichéd, have been reworked from the factors identified as a project's success factors and lessons learned – they have not been condensed from views presented earlier in the publication.

*Table 18: Part 1 of 2. Alliance's success factors.<sup>51</sup>*

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#### **Attitude and commitment**

- **Project's advantage.** Alliance team members must (have the possibility to) follow the "best of the project" principle in all project-related decision making.
- **Unprejudiced decision making.** The actors must be ready to test and adopt new technology and new solutions to promote excellent results.
- **Commitment of parties.** The owner and service providers must commit themselves to the project including upper management and alliance management group members.
- **Confidence building.** The actors are to purposefully promote the building of active collaborative relationships and creation of mutual trust.
- **Atmosphere of openness.** The relationships between alliance partners are to be based on openness and confidentiality in all operations and exchange of information.

#### **Selection and organising**

- **Selection of execution team.** Effort must be put into the selection of the alliance team in order to maximise the competence and performance of the team for attaining set goals.
- **Quality as basis of selection.** In implementer selection competence criteria, generally quality factors, must be emphasised over price.
- **Earlier experience from collaboration.** Actors with clear proof of successful cooperation in earlier projects should primarily be selected as alliance partners.
- **Qualities of personnel.** Persons selected for the organisation should be team players as well as unprejudiced and creative thinkers.

#### **Integration and cooperation**

- **Participation of facilitator.** An impartial expert focusing on the development of cooperation and observation of alliance principles is to be engaged at a sufficiently early stage.
  - **Joint alliance office.** The alliance organisation should be a united team whose formation and activities are supported, for instance, by common space arrangements.
  - **Unity of organisation.** The alliance team must display unity and operate under the name and logo of the alliance abandoning member organisations' logos.
  - **Continuity of participation.** Actors representing different competencies are to stay involved for the length of the project to be able to meet the goals in the best possible way.
  - **Informing owners.** Owners are to be kept informed about all project issues so they can make decisions that support project implementation and promote its goals.
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<sup>51</sup> Summarised from: Jefferies et al. (2006); CRC (2004); Jefferies et al. (2000); Kumaraswamy et al. (2005). The summary considers neither the price formation mechanism created in this study nor its impacts.

*Table 18: Part 2 of 2. Alliance's success factors.*

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### **Goals and monitoring**

- **Setting of goals.** The actors are to set such sufficiently challenging goals for the alliance that they cannot have precise information on how they can be attained.
- **Phasing of management by objectives.** The project is to be phased to serve the monitoring of realisation and setting and updating of new demanding objectives.
- **Key profit areas.** The team must ensure that project-specific profit areas and indicators that guide and motivate the teams to reach set goals are defined.
- **Impact of goals.** The parties' common interpretation of goals, and the guiding influence of goals must be ensured through risk sharing and incentive arrangements.
- **Awareness of goals.** It must be ensured that people at all levels of the project organisation are fully aware of the goal and special objectives of the project.

### **Costs and payments**

- **Accuracy of budgeting.** The owner must prepare the budget carefully before the project is launched since it guides thinking and sets expectations for the target cost.
- **Definition of target cost.** The owner must be involved in the definition of the target cost to avoid it being interpreted as a tender or an opening of discussion.
- **Evaluation of target cost.** The owner should make use of benchmarking of costs so that a low implementation costs is not sought at the expense of quality and life-cycle goals.
- **Workability of the incentive system.** The actors must agree to a payment mechanism that is reasonably symmetric (profit/loss) and fair to all parties.

### **Project management and decisions**

- **Joint management system.** The alliance partners are to have a single joint project management system for dissemination of information and facilitating management.
- **Evaluation of design.** External expert evaluation of design is a proven method of ensuring the realisation of the value-for-money goal.
- **Workability of quality assurance.** External quality assurance as well as monitoring and evaluation of performance indicators are indispensable in ensuring good governance.
- **Evaluation of performance.** The alliance must conduct continuous performance measurement/benchmarking to allow identifying success areas and targets of improvement.
- **Purposefulness of the owner.** The owner must show leadership in order to ensure that proposals intended as design changes generate added value without weakening quality.

### **Workshops and seminars**

- **Design workshops.** Service providers wishing to join the alliance must conduct workshops for building a team and creating team spirit already before the owner's workshops.
  - **Selection-phase workshops.** The owner must conduct exhaustive workshops with all tenderers in order to create a functioning basis for good cooperation.
  - **Value-management workshops.** The actors must conduct joint value-management and problem-solving workshops in order to attain the intended economic efficiency.
  - **Personnel seminars.** The project is to hold repeated alliance seminars for site personnel in order to include them in the cooperation procedure.
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Title <b>Project alliance. The competitive single target-cost approach</b>		
<p><b>Abstract</b></p> <p>This publication reports on the development work focusing on the procedures of a procurement method for a construction project that integrates early, competitive implementer selection and sharing of risks between the parties. An approach where the key parties bear the risk jointly and service providers are rewarded based on the success of the overall project, encourages the actors to consider each other's views and to cooperate effectively. The integration of know-how creates a basis for innovation and excellent performance – especially in the case of projects that involve a great deal of uncertainty.</p> <p>The procurement (or project delivery) method in question is project alliance where competitive selection is integrated with collaborative and early selection of service providers from the viewpoint of design in a novel way. The publication describes an operational model where selection takes place through elimination of candidates and a subsequent two-phase tendering process: the qualitative tender precedes the workshops that are part of evaluation, followed by submission of tender price data. The price is made up of unit prices and overhead rates while price and scope assessments common to all competitors are used selectively for comparison calculations.</p> <p>In the developed operational model selected service providers, designers and builders, develop the project and its designs in cooperation with the owner before the actual target cost is set. The revised tender price and target cost together with the predetermined allocations of cost overruns and underruns determine the rewards of service providers at different performance levels. The idea is to spur actors to invest especially in the pre-implementation development phase which is also promoted by the project's incentive system. An attempt should also be made to incorporate into the system the impact of the realisation of the key qualitative target areas.</p> <p>Other issues the publication deals with include the features of project alliance, its potential advantages and drawbacks, assessment of the suitability of alliancing and prerequisites for using it as well as the administrative structure of the organisation formed by the partners. The so-called competitive single target-cost project alliance presented has been developed in close cooperation with a wide expert network of practical actors. Their view is that the project alliance approach produced as a result of the work is a suitable and useful for the implementation of demanding transport infrastructure projects, road and rail-way projects, which were the primary application.</p>		
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A project alliance is a project procurement method based on the sharing of risks between the key partners. The publication describes a new model of project alliance that integrates selection of service providers on the basis of price and quality factors, that takes place early in the process in relation to design, with later definition of target cost. Tender price and target price are key elements of the payment basis solution, but the realisation of the project's qualitative goals also has an impact on the payments to service providers.

Besides the selection of the design-construction team and the project's payment basis solution, the publication also deals with the features and potential advantages and drawbacks of project alliance and evaluates its suitability and the pre-conditions for its use and the administrative structure of the joint organisation formed by the partners. Cooperation and incentiveness are key constituents of the model.