Contents

Introduction

This is the new manual for the Public Private Comparator (PPC). This manual is a further refinement of the version published in 1999 and it includes new insights and experiences from projects. The main differences between the old and new versions are highlighted in Appendix E.

In addition to this PPC manual, the Pubic-Private Partnership (PPP) Knowledge Centre has also drafted a Public Sector Comparator (PSC) manual. These manuals on the use of these two instruments for financial comparison are part of a series of documents aimed at explaining the organisation of PPP projects and they enable people involved in such projects to share the experiences of others in this area.

The manuals for the PPC and the PSC are based on the DBFM/O contract. Such contracts integrate the Design (D), Building (B), Financing (F) and Maintenance (M) or Operation (O) of the project concerned.

The PPC is the first instrument which gives you insight into the possible added financial value or financial advantage of a PPP procurement by comparing this form of procurement to a traditional public sector approach.

This manual is primarily aimed at members of a PPC team within a project organisation (see also Module 1). The PPC team is responsible for the quality of the PPC. This manual also provides insight into the methodology, and clarifies the PPC process for others less directly involved with drawing up the PPC, such as the decision-makers and auditors.

The PPC provides an initial financial comparison of the public and public-private partnership (PPP) procurement options for the project before a decision is made on which form of tender to invite. This comparison forms the financial part of a series of arguments used by those responsible for the project as to whether the project should be carried out as a PPP.

There are a number of pre-conditions which must be met before a PPC should be started. These include defining the scope of the project, an initial analysis of the risks involved, a basic specification of the required outputs and a definition of the public procurement option. Diagram 1 shows the chronological process which leads to the completion of the PPC.

Diagram 1: The process leading to completion of the PPC.

Creation of the plan:

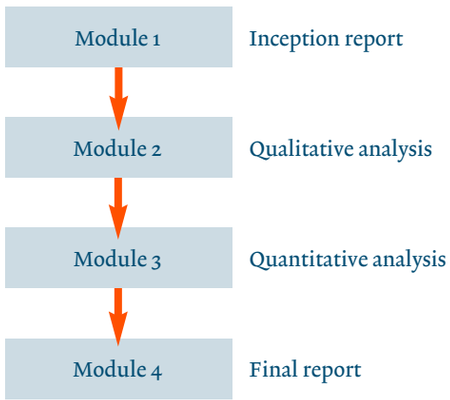
- Definition of the aims.
- Discussion of benefits and necessity.
- Budget.
- Establish project organisation.
- Public-public agreements.
- Market consultation.
- Definition of the scope.
- Basic specification of the outputs.
- Initial analysis of risks.
- PPC.

Initiate tender process if appropriate.

The manual always focuses on the financial benefits - ie whether one procurement option is cheaper than the other. The PPC is an instrument for financial comparison and does not therefore take other non-financial factors into account. The final decision should also take both qualitative and quantitive non-financial factors into account, for example the economic effect of early completion of a project such as a road improvement.

The final choice between the public or PPP procurement of a project is taken by the decision-makers after weighing up all the available arguments, both financial and non-financial.

The manual consists of four modules which guide you through the steps required to draw up the PPC:



As each module is explained, an explanation or concrete example is given to help you understand the process. Where examples are given, this is noted in the text and the examples are attached in Appendix F.

Module 1: Inception report
This module describes how to start the PPC process, who should be involved and which points you should consider from the outset in order to achieve a good final result.

Module 2: Qualitative analysis
In this module, a list of all the expected costs, income and risks over the project life cycle is made. Then these elements are analysed for possible differences between the public and PPP procurement options. The diagram below shows which costs, income and risks are important during the project.

Diagram 2: Project Life Cycle

Module 3: Quantitative analysis
In this module all the essential costs, income and risks which were identified in the previous module for the public and PPP procurement options are quantified using the analysis of the differences between the two options in Module 2.

The amounts are then entered into a cash flow chart, a discount rate is determined and the present value of the project is calculated for both procurement options.

Module 4: Final report
In Module 4 you summarize the results of the Qualitative and Quantitative analysis together and answer the questions posed during the preparation. The best format for this is by means of conclusions and a clear recommendation for one of the procurement options. Mention also the points which should receive special attention in the subsequent phases of the project, what action should be taken, and who should be responsible in the next phase of the project, and whether or not a PSC should be drawn up. Include the timing of, and responsibility for, the PSC.

This manual also has several appendices. These include a definition of terms used, an explanation of risk analysis theory and some worked examples to illustrate the examples given.

Diagram 3: The PPC Manual in brief: four modules

Module	1:	Inception report
Steps:	1a	describe the alternatives, scope, plan & parties involved
	1b	create the communication plan
Module	2:	Qualitative analysis
Steps:	2a	describe cost, income and risk amounts
	2b	investigate differences between the public and PPP procurement options
	2c	assess the differences and draw initial conclusions
Module	3:	Quantitative analysis
Steps:	3a	create overview of costs, income and risks for a public procurement option
	3b	quantify the differences between a public and a PPP procurement and draw up an overview of costs, income and risks for the PPP option
	3c	create two cash flow charts, calculate the present value of the project and make the comparative matrix
Module	4:	Final report
Steps:	4a	describe the results
	4b	draw conclusions and make recommendations

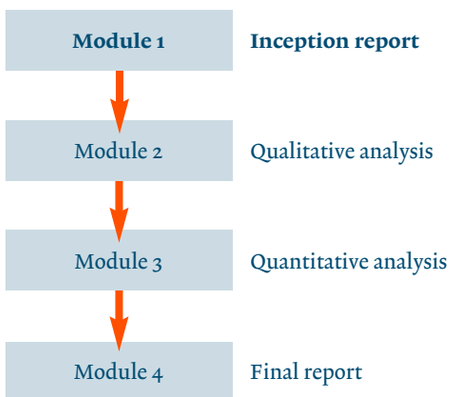
If you require assistance in drawing up the PPC the Dutch PPP Knowledge Centre can help you in several ways. The manual already indicates the points where we can give you support. You can also go to the manual's interactive PPP-PSC users' page via our website (www.minfin.nl/PPS) where you can discuss the manual with us and other users as well as posting your specific questions. We hope that you will then be able to create a good PPC for your project.

Good luck.

The Hague, August 2002

Module 1: Inception report

1



Step 1a: describe the alternatives, scope, plan & parties involved
Step 1b: create the communication plan

The Inception report helps the PPC team prepare for the actual PPC research and reduces the chance of the PPC process getting stuck part way through because its basis is unclear. This module shows you how to start your PPC, who should be involved and which points should be taken into consideration at the outset so that you can ultimately create a 'good' PPC.

Purpose

The purpose of this module is to structure the process of creating a PPC and is to provide decision-makers and the PPC team members with an understanding of why and how a PPC is made.

Preparation

The Inception report describes the limiting conditions for the PPC and their consequences:

- Is the purpose of the project and its necessity sufficiently clear?
- Are there sufficient resources available or is there at least a realistic expectation that a sufficient budget can be obtained?
- Is there sufficient commitment at government level?
- Is the project scope clearly defined?
- Has an initial analysis of the risks been carried out and have all the risks been subsequently clearly allocated?
- Is an initial version of the output specification available?
- Has a public procurement option been defined based on the experience and capacity of the public commissioning authority? This may be a traditional specification or a Design and Build (DB) contract.

The answers to the questions posed here will ensure that all interested parties have a good understanding of what exactly is meant by the public and PPP procurement options for the project and what its exact scope is. Confusion during the course of the PPP project can then be avoided as different writers and decision-makers interpret the assumptions and concepts in different ways.

The Inception report also describes the planning, the parties, the external constraints and the communication structure during the execution of the PPP project.

Output

The Inception report includes an outline of the project and a communication plan, and should take about one to two weeks to draw up. Examples of Inception reports from existing PPCs may be useful and advice may be sought from the PPP Knowledge Centre or a PPP unit within your organisation.

Step 1a: describe the alternatives, scope, plan & parties involved

Your Inception report will start by describing the structure of the PPC process for the benefit of decision-makers and other members of the PPC team. This step has been completed properly when members of the team no longer have any "who, what, why and how much" questions.

You can filter out the most important questions that need to be answered during your initial discussions with the decision-makers and members of the PPC team. The list below shows some of the questions which are important to answer:

1. Why am I making a PPC (goals)?
2. How can I ensure that the results fulfil the objectives of the PPC?
3. What are the procurement options and what assumptions should I make?
4. Who do I involve when making the PPC?
5. Which agreements should I make?
6. How much time and money will the PPC cost?

The project leader should be able to answer all these questions. The process of finding answers to these questions can also be used to increase the support which you will need to complete the PPC. In this case project leaders from previous PPCs, decision-makers and members of the PPC team may also be involved.

Sub 1. Why am I making a PPC?

The first thing to do is to explain why the PPC is being made. Define the central question clearly and concisely. Then go on to explain what will be done with the answers and who will need to take action.

The PPC compares a public and PPP procurement based on a financial evaluation. The main question is which option is financially most attractive. Describe also who has commissioned the project and what should happen at the close of the PPC.

Sub 2. How can I ensure that the results fulfil the objectives of the PPC?

You need to consider the criteria which the results of the PPC must satisfy to ensure that the PPC answers the central question - which is the most financially attractive form of procurement? Consider for example what information should be available and in what form. You can then refer back to your Inception report when completing the subsequent PPC modules to check whether the project is still on track and whether the steps taken in the modules actually contribute to answering the central question.

The PPC results are divided into two sections:

a. A step by step explanation of the route taken in order to answer the central question. This can be split as follows:
   - a description of the differences between the public and PPP procurement options in terms of costs, income and risks;
   - a quantification of these differences;
   - the cash flow summary for both procurement options in which all costs, income and quantified risks are calculated for the whole life cycle of the project;
   - a financial comparison of these two cash flow summaries based on the present value method.

b. The answer to the central question - which procurement option gives the highest added value, or is most financially advantageous.

Sub 3. What are the procurement options and what assumptions should I make?

The description of the procurement options and the assumptions made are designed to set a baseline from which the PPC team, supplemented by other experts and specialists, can work in subsequent modules.

You do this in three steps:

a. describe the public and PPP procurement options;
b. make assumptions for the project, such as the project scope and baseline;
c. define the assumptions and the baseline for this specific PPC.

Step a. *You describe the two procurement options which are to be compared:*
- *the public procurement option*
- *the PPP procurement option*

For the public procurement option you should describe how the project will be phased and executed. This could be the traditional way whereby separate tenders are requested for the design, construction and maintenance but could also be an innovative form of tender for the design and construction work as one integral contract. The choice depends on the experience and capabilities of the commissioning authorities in working with the various procurement options. The public procurement option should not be significantly different from similar projects commissioned recently by the same authority.

The basis of the PPP procurement option is the invitation to tender for the integrated design, construction, financing and maintenance of the project. In the PPP procurement option, the commissioning authority is supplied with a service and not a product, and payment is based on achieving specified outputs as defined in the payment mechanism. The integration ensures the coordination between the initial investment, maintenance and running costs throughout the project life cycle. The allocation of risks between the PPP Contractor and the commissioning authority is based on both management ability and capacity.

Step b. *You make assumptions for the project, such as the project scope and baseline.*

In this part you describe the scope of the project and the required final product or service. You should give an overview of the project boundaries and the background to the project. Examples of this would be a general description of the project and a summary of the discussion of its benefits and necessity.

Step c. *You define the assumptions and the baseline for this specific PPC.*

For the PPC you will probably need to make a number of assumptions about the project such as the baseline for the project and the project life cycle. You will also have to estimate other factors such as the annual rate of inflation. The PPP Knowledge Centre and existing PPCs can help you to define these assumptions.

Sub 4. Who do I involve when making the PPC?

The PPC is developed by a team. The team requires contributions from two different sources:

a. expertise concerning the content: this can be technical, financial or related to the processes involved;
b. information and feedback from those people with influence on the project and decision-makers. One of the aims here is to create and maintain support for the project.

Step a. *Expertise concerning the content*

Expertise concerning the project content comes from experts and specialists with knowledge of all or part of the project, for example an estimator. Also colleagues from your own organisation who have experience with the PPC can be included in your PPC team. The team could also be supplemented by consultants or staff from the PPP Knowledge Centre or the PPP centre from within your own organisation. These people have experience with the PPC and they are available so that you don't have to reinvent the wheel!

Step b. *Information and feedback from those people with influence on the project and decision-makers.*

The process of acquiring the necessary information keeps the team in contact with the supporting organisation, the decision-makers and those people with influence on the project, and the support staff of these key individuals should also be included in the PPC process so that they understand the outputs better and it will therefore be easier for them to make a commitment. This is important for the actual decision-making. Representatives of the decision-makers may be at policy officer and lower management levels within the organisation - people who are personally involved with the project. Representatives of those with influence on the project will usually be found further away or outside the organisation. For government projects these would include management from the Financial and Economic Affairs Directorate of the department and the Government Finance Inspectorate (Treasury Department).

Sub 5. Which agreements should I make?

It is useful to document a few house-rules for cooperation within the team and with external parties. The rules for cooperation should cover the following:

- the tools to be used, such as an expert workshop or a brainstorming session;
- time to be spent and the distribution of costs;
- quality of the information to be supplied by team members;
- substantiation of the PPC results. The team reaches its conclusions and makes recommendations by consensus.

Sub 6. How much time and money will the PPC cost?

Drawing up a PPC normally takes between two to four months. An indication of the time to be spent on the individual modules is given here:

Inception report	1 - 2 weeks
Qualitative analysis	3 - 5 weeks
Quantitative analysis	5 - 8 weeks
Final report	1 - 2 weeks

Based on these guidelines, you can make a detailed plan. Include in your plan who should contribute what and in which phase, and a schedule of the PPC project team meetings.
It can be difficult to determine exactly how much time the team leader and members of the team will need to draft the PPC. It will partly depend on the type of project and its complexity. From experience, the project leader is usually required full-time while some of the other team members may only be involved for one day a week.
The cost of formulating the PPC will depend on the time spent by the project team members and the external consultants and specialists involved.

Step 1b: create the communication plan

From our experience in other projects, we know that in order to obtain acceptance of the results you need to involve not only the PPC project team members, but also all other interested parties. You can distinguish between:

- the decision-makers, who are not interested in the details, but in the influence that the PPC has on the decision-making process.
- an active communication group - the members of the PPC team.
- a passive communication group - other people involved in the project, directly or indirectly.

For each group you should decide who will communicate, and the frequency and form of communication. You can choose to communicate via an e-mail newsletter, regular meetings, via minutes and reports or using a printed newsletter.

Example

Step 1a: describe the alternatives, scope, plan & parties involved

In preparing for the construction of a road to link the A101 to the A18, the Directorate-General for Public Works and Water Management (RWS) forms a project team. Taske Streefman is appointed project leader. Together with her manager she wants to use the PPC to investigate whether the project will be more economical as a public project or as a PPP procurement.

The benefits and the necessity of the project are not in question and Taske verifies through her manager whether there is sufficient support within RWS to carry out a PPC. At the same time she starts preparing an Inception report, at which point she involves some potential team members and a consultant from the PPP Knowledge Centre.

1. Why do we need a PPC for the A101/A18 project (goals)?

The PPC is designed to make a financial comparison between the public and PPP procurement options of the A101/A18 project and will be used in proposing the selection of the procurement option.

2. How can I ensure that the results fulfil the objectives of the PPC?

Taske wants the PPC to help the decision-makers when they have to choose between the public and PPP development of the project. This means that bo th procurement options must assume the same output quality and results so that they can be compared. Taske makes a short description of the PPC method from the manual.

3. What are the procurement options and what assumptions should I make?

Taske describes the two procurement options and notes several assumptions:

a. The public procurement option

Taske looks at other documents made by her organisation and refers to the initial design for the road and the plan that has already been made. In the plan, RWS acquires the land required for the design and two sets of requirements are drawn up for the construction. Then an external organisation will assist with the design and an invitation to tender will be issued for the construction. RWS will be responsible for the management and maintenance of the road, as well as for the project funding. The commissioning authority will underwrite any extra work required resulting from changes in the design and any extra maintenance required because the quality of the road is not up to standard after a few years.

b. The PPP procurement option

Taske describes the DBFM contract in detail. The A101/A18 project requests a service from the private consortium, that is the availability of the road over a certain period of time and the handover of the road to a specified standard of quality to RWS at the end of this time. The consortium will be remunerated based on the services provided. Agreement is reached about who is responsible for which parts. There are several aspects which cannot be insured, such as terrorist attacks or nuclear disaster, these remain risks for RWS. All risks concerned with extra costs or exceeding the expected time for the design, construction and maintenance of the road are to be borne by the consortium.

c. Project assumptions

The current link between the A101 and A18 (about 20 km) is a two-lane road. This road will be rebuilt to become a motorway (four lanes, 20 km, no junctions, no opening bridges, etc.). This will cater for the growing traffic requirements and it will improve traffic safety. There are three new sections of road involved: section A is 8 km long with a fly-over, section B is 7 km long and the third section, section C, is 5 km long and includes a tunnel under the Ommerlander Canal, a busy inland shipping route. The total noise output from the road should be less than 55 dB(A).

d. Specific assumptions for the PPC

The project will commence on 1 January 2002 and the road must be complete and ready to use on 1 January 2008. The road must be available for use up to 31 december 2033 and then be handed back to RWS in such a state that no maintenance is required for the coming five years. The road must be available for use 99 percent of the time between 6:00 and 20:00 hours and be available 90 percent of the time between 20:00 and 6:00 hours.

4. Who do I involve when making the PPC?

Taske proposes including several experts from within and outside the RWS organisation in the PPC team and also to involve two general experts (as consultants to the decision-makers):

Mrs A - expert from Public Works and Water Management;
Mr B - Province (the province is in favour of executing the project quickly);
Mrs C - financial controller for the RWS regional office;
Mr D - representative of the local authorities involved in the planning procedures and the local political-social support;
Mrs E - consultant from organisation X, with experience in drawing up a PPC and in risk assessment;
Mrs F - from the market development team, RWS construction services;
Mr G - Taske's colleague, who was project leader last year in a similar project and who also has experience in the design construction and maintenance of roads.

Further Taske agrees to keep the following people regularly informed and to involve them in ad hoc meetings. Mr I from the PPP Knowledge Centre, Mr J from the Department of Financial and Economic Affairs at the Ministry of Transport, Public Works and Water Management and Mrs K from the Government Finance Inspectorate.

In consultation with the project team, Taske draws up a list of experts who may contribute ideas and information on an ad hoc basis or who might be invited to brainstorming sessions. In this way she hopes to obtain the best available information as quickly as possible in creating the PPC.

5. Which agreements should I make?

Taske repeats the general agreements for supplying information and the results (everyone involved is obliged to supply the best possible information). All project team members agree to make at least one day per week available for the PPC team. Taske herself will work four days a week on the PPC.

6. How much time and money will the PPC cost?

Taske has drawn up a comprehensive plan which assumes that the PPC can be completed within three months. She has also made an estimate of the costs involved in drawing up the PPC, for example the cost of the internal and external experts.

Example

Step 1b: create the communication plan

Taske is the project chairperson. She will inform the team members and potential users of the PPC about its conception. Her communication plan is aimed at:

- the active communication group;
- the decision-makers;
- the passive communication group.

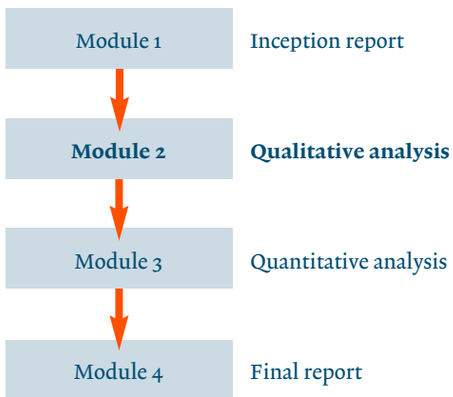
Taske will have closest contact with members of the PPC team. This is the active communication group. She makes a distinction between the more formal communication, and informal communication.

Taske wants to keep the decision-makers informed of the PPC team's activities via a short e-mail which she will send once every two weeks. In addition a short newsletter will be composed by two members of the PPC team which will be distributed more widely. She also makes regular appointments with the decision-makers to discuss the project.

The passive communication group consists of local councillors from the area where the road will be built and others who are marginally involved in the project or the PPC. This group will receive the short monthly newsletter and a copy of the official press releases which will be written by the RWS PR official.

Module 2: Qualitative analysis

2



Step 2a: describe the costs, income and risks

Step 2b: investigate the differences between the public and PPP procurement options

Step 2c: assess the differences and draw initial conclusions

Purpose
The purpose of this module is to obtain initial insight in to the financial differences between the public and the PPP procurement options.

Structure
In this module there are three main steps:
- to create an overview of the relevant costs, income and risks in the execution of the project;
- to investigate the qualitative differences between the public and the PPP procurement options;
- to present the results of the research in a matrix and to draw initial conclusions on how best to proceed.

Preparation
Module 1 creates the conditions which you need to draw up the PPC, such as the description of both procurement options. Because it will not be clear to everybody how both of these options work, you will need to spend some time on the presentation of both forms. You can involve external experts where necessary.

When you are preparing your project use all the available studies, estimates and other relevant material you can find about your project and other similar projects.

Output
You should be able to complete the Qualitative analysis (Module 2) within three to five weeks. Using this information you can decide whether to proceed with the PPC or not. If you do proceed you will do the Quantitative analysis in the following module (Module 3).

Step 2a: describe the cost, income and risk amounts

The first step you make in the Qualitative analysis is to describe all the costs, income and risks which will occur during the life cycle of the project.

To do this you will need expertise in the breakdown of the various cost, income and risks for the project. The PPC team, supplemented by design, construction and exploitation specialists, will meet several times to draft a clear and complete list of these elements, guided and supervised by the project leader.

The list below gives a rough division of the various elements involved. The PPC team should refine this list for their specific project to obtain an understanding of the project cash flows.

1. Costs:

a. Preparation costs;
b. Transaction costs;
c. Realisation costs (design, acquisition, construction);
d. Maintenance or exploitation costs (including operating costs).

Sub a. Preparation costs
These are the costs which will be incurred prior to the invitation to tender, including the cost of drafting the requirements, consultation and other activities to create support for the project.

Sub b. Transaction costs

These are the costs involved in the invitation to tender process. These costs include:

- legal, technical and financial support;
- drafting the tender documents;
- assessing the bids and negotiating with private parties.

Sub c. Realisation costs

These are other costs involved in design and construction.The design costs must cover all the costs involved in the design of the project, for example:

- fees for architects and designers;
- the cost of translating the basic design into a detailed specification for civil and mechanical engineering.

The realisation costs also include a list of investments which are required for the construction of the project. Include here all possible sources of assistance, and don't forget to include possible acquisition costs as well. The list below gives you an idea of the sources of these costs:

- costs for the acquisition and development of land;
- training;
- labour costs for construction;
- raw materials required for the construction;
- payments to suppliers;
- machines required for the construction;
- insurance costs during the construction period;
- management costs during the design and construction.

Sub d. Maintenance or exploitation costs

These are the maintenance and running costs incurred during the project life cycle. The upkeep costs cover all investments and maintenance. Operational costs are incurred during the project in order to deliver a service.

Included in the operational costs are aspects such as:

- costs incurred for personnel, including social security payments, pension contributions and other direct personal costs;
- recruitment, education and training costs;
- procurement of supplies, raw materials and consumables;
- the cost of management and quality control once the project is operational;
- administrative overhead costs related to project management and the management of capital goods during the complete life cycle of the project;
- insurance costs once the project is operational.

The running costs include:

- the cost of maintenance and repairs;
- reinvestments;
- replacement investments.

2. Income

a. Income from sales or rental
b. Income from the residual value

The PPC distinguishes between two different types of income:

a. Income from sale or rental (all the income during the exploitation period)

The income depends on the character of the project. Often in these projects the income is for the provision of a facility or services such as to let out the extra capacity. Where property is concerned this is the income from rental or lease contracts.

b. Income based on the residual value of the project

You only take the residual value into account if:

- in the case of the PPP procurement option the project is handed over to governmental authorities at the end of the contract period for a residual payment; or
- if the residual value in the PPP procurement option differs substantially from the residual value in the public procurement option.

In the list of possible income with the public option include only those elements which can reasonably be expected to be generated. Potential sources of income which have yet to be proven in the market should certainly not be included here.

3. Risks

a Risks during the preparation phase;
b. Risks during the transaction phase;
c. Risks during the realisation phase;
d. Risks during the exploitation phase;
e. Risks concerning income.

Using the list of cost and income elements you made above, you identify per element the most important risk factors. Appendix C shows a number of possible risk factors.
Risk analysis is a specialist technique, and in order to draw up a complete and comprehensive list of possible risks it may be necessary to use external experts.

Step 2b: investigate the differences between the public and PPP procurement options

When you have completed the overview of costs, income and risks, you analyse the financial differences between the public and PPP procurement options for each element.

In this step, more so than in the first step, you require expertise and experience gained from similar public and PPP projects. There are several ways in which you can gain this knowledge:

- consult project leaders or others with experience in similar projects with public development and also where possible with the PPP procurement option. You can also set up a brainstorming session to discuss the differences together;
- consult the documentation from similar projects;
- if there is little or no experience of the PPP procurement option available, then you can gain better insight into the possible differences by holding several workshops. Participants should be members of the PPC team; specialists and representatives of the decision-makers can also contribute to these meetings. The PPP Knowledge Centre can also assist at this point;
- you can simulate the bidding process to gain better insight into the way the PPP procurement option works. This simulation takes the form of role-play. Members of the PPC team play the roles of developer, constructor, manager, repairs coordinator and the bid manager within the private consortium. The bid manager will especially focus on keeping the costs low in order to get the bid accepted. The others show where their margins lie and so they all search for the most advantageous solution.

In cases where the team has little experience with PPPs, the analysis can be especially tricky, it is not always obvious as to which assumptions can be made and where the differences in costs, income and risk amounts can be found. The following points describe a number of extra considerations.

Integrated approach
A possible problem with a PPP procurement is that you come to the conclusion that the integration of design, construction and maintenance has its advantages, but that it is difficult to separate and attribute the various costs and risks. This can be done with the help of design, construction and development specialists.

Hidden costs
Public estimates are often incomplete because some of the costs incurred for the project are booked elsewhere in the organisation. Sometimes these are a relatively small proportion of the total investment, but there can also be quite considerable costs which are made for the project design, integration of the design and construction (legal and management costs) and general costs for project management. You should only include costs here which are incurred after the PPC has been made. This of course includes overhead or other fixed public costs.

Allocation of risk
Risks which the private consortium can best carry or manage are included here. There is a price attached to risks which are transferred to the consortium in a PPP development. If the public authority decides to bear this risk, then this must also be valued. If you think that the public authority can manage this risk better, this will probably mean that the risk has a lower value than when it is borne by the consortium. The situation can also work the other way.

Maintenance of quality
That output specifications should be the same for both procurement options and thus the same quality of product or service should be supplied. The standard public estimate may need to be adjusted to reflect the output specifications used.

Project focus
When describing the differences between the public and PPP procurement options, remember the link to your specific project situation. It is important here to note the differences in the critical success factors in the different approaches for your particular project and project circumstances.

The PPC team should check the relevant cost, income and identified risks step by step and investigate differences that could occur between the two procurement options.

A checklist of possible differences has been drawn up based on project evaluations in the United Kingdom and on project experience in the Netherlands. This describes the arguments for and against PPP. Each argument should be assessed for its relevance to the specific project context. You can use this checklist (see Appendix A) during the preparation of a brainstorming session or for a session with experts. You can also use any differences between public and private procurement options described in a recent evaluation document or from previous PPCs. (Much research in this area has been carried out by universities and the National Audit Office in the United Kingdom.)

The checklist of possible differences is not exhaustive nor is it limitative. Each project has unique factors which can inspire you to identify new, previously unquantified risks. Be creative, and do not be afraid to mention these new risk which you can then refine in discussions with your fellow team members.

Output
Insight into the differences between the public and PPP procurement options for the project, expressed in terms of the influence on the estimates for costs, income and risks.

Step 2c: assess the differences and draw initial conclusions

You close the Qualitative analysis phase by creating a matrix and describing your initial conclusions.
The PPC team assigns a plus or minus (or a double plus or minus) to each of the financial differences between a PPP procurement as compared to a public procurement. Lower risks and costs, or higher income in the public procurement should be given minuses, higher risks and costs pluses.

Using this matrix the PPC team should decide whether it is relevant to continue to develop the PPC with the Quantitative analysis. There can be two situations where PPC is closed (for the time being) after the qualitative module:

- the matrix with the plusses and minuses shows that PPP development is not advantageous;
- there is not enough project knowledge and there is insufficient data available to enable the differences to be quantified at this time.

Do not skip over the Quantitative analysis, because you think that using the Qualitative analysis alone a choice for the PPP procurement option can already be made. It is not sufficient to conclude that one procurement option is cheaper than the other for the public authority. This conclusion must also be quantified and substantiated.

Output

A qualitative assessment of the differences between the public and PPP procurement options on the costs, income and risks related to the project.

Example

Step 2a: description of the project costs, income and risks

Taske starts this module by organising a meeting with the PPC team to identify all the cosst, income and risks which may be incurred over the project life cycle. During the meeting the team are introduced to the various elements which are relevant to the project. Taske emphasises that this project is not only for the initial investment but that the project must also include 25 years of maintenance and management.

Taske uses the four-phase classification suggested in the manual for cost, income and risks:

- preparation;
- transaction;
- realisation;
- maintenance and operation.

The specialists in the team expand on these four phases for the cost, income and risk items. As a team they discuss whether all of the elements are relevant and whether some of them are duplicated. Taske is surprised that more possible income elements are identified than she had expected. This results in a long list of cost elements some of which are irrelevant for either procurement option.

Example

Step 2b: investigate the differences between the public and PPP procurement options

Taske organises a workshop in which the PPP invitation to tender is explained and where each member of the PPC team is assigned a role as a member of a private consortium which is bidding for the project. The motivation becomes clearer with this simulation. The constructors in the team try to get the highest possible price for their part, but this is rejected by the banks. The bid coordinator attempts to find the best mix between investment and maintenance costs, the designer sees opportunities for extra income and the institutional shareholder focuses on low initial investments in order to beat the competitors and to have the greatest chance that there will be a return on his investment in the tender process.

Specialists analyse each cost element to see if there are differences between the public and PPP procurement options. In many cases there is no difference, but there are many cost elements where there is an incentive for the private consortium to make cost savings. The PPC team considers that the transaction costs for a PPP are higher and wonder whether the government could not finance the project more economically itself. This last point will also be taken into consideration when the correct discount rate is calculated in Module 3.

A number of risk amounts which are included in the list are assigned to the party bearing the risk for both the public and PPP procurement options. The results are shown in the table below.

risk	public development	PPP development
extension of the preparation time	public	public
disappointing invitation to tender results	public	public
incomplete design	public	private
extra costs during construction (realisation)	public & private	private
delays during construction (realisation)	public & private	private
extra costs during the maintenance phase	public	private

The team discusses whether the parties bearing the risk are indeed those who can best carry and manage the risk. They come to the conclusion that the parties who are best capable of bearing and managing the risk will require the lowest fee for doing so.

The team also discusses the value of a fast-track project. According to the PPC manual, value should only be accredited to a fast-rack project if this means that the total cost will be lower or that the project will generate income sooner.

A summary of the differences which were identified during the brainstorming session are shown in Example 1 (Appendix F). Taske ensures that a written explanation is also available.

Example

Step 2c: assessing the differences and drawing initial conclusions

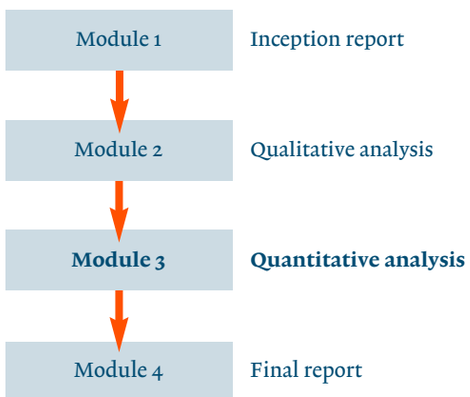
The PPC team takes two steps to evaluate the differences and to draw conclusions:

- elements which are expected to make a difference to the level of costs, income and risk are listed;
- for each item on the list the difference between the public and PPP procurement options is illustrated with plusses and minuses (double).

The results of this assessment are shown in Example 2. Taske discusses these results with RWS colleagues and an external consultant. Based on the information contained in this example the members of the PPC team decide unanimously that it is worthwhile to continue with the PPC and do the Quantitative analysis. In this next phase, the PPC team will expand upon and quantify the qualitative differences which have been identified.

Module 3: Quantitative analysis

3



Step 3a: draw up a list of costs, income and risks involved in a public procurement

Step 3b: quantify the differences between the public and PPP procurement options and draw up the list of costs, income and cost elements involved in a PPP procurement

Step 3c: draw up two cash flow charts, calculate the present value and make the comparative matrix

Purpose

The purpose of this module is to quantify the differences between and the public and PPP procurement options identified in Module 2.

Structure

This module consists of three parts which give the PPC team insight into the financial differences between the two procurement options:

- the project costs, income and risks are estimated for the public procurement option;
- the differences between the public and PPP procurement options are quantified and then the project costs, income and risks for the PPP procurement option may be estimated;
- the amounts for both procurement options are then entered into a cash flow analysis. This enables the amounts to be expressed in terms of their present value and to be placed in a matrix.

Preparation

In Module 2 you were able to gain insight into the various costs, income and risks and you made an initial distinction between the public and PPP procurement options.

Output

You can make the Quantitative analysis (Module 3) within five to eight weeks. At the close of this module you will have:

- a cash flow analysis for the public procurement option;
- a quantified overview of the differences between the public and PPP procurement options;
- a cash flow analysis for the PPP procurement option;
- a matrix containing the relevant amounts expressed in terms of the present value of both procurement options.

Step 3a: draw up a list of cost, income and risk elements involved in a public development

The project costs, income and risks are now estimated for the public procurement option. The estimator should take the following points into consideration:

1. Provide an explanation

In practice, when new information comes to light values which have already been estimated are recalculated. For this reason we recommend that you include an explanation of the calculation for each element in the estimate. This includes the assumptions you made, the sources of the costs and values used and a clarification of how the team calculated the value. Explain also which costs and risks you have deliberately left out. Your explanation can be in an appendix.

2. Cluster

The cost elements mentioned in the previous module are already divided over the four phases of the project. Try to group the cost elements within each phase as much as possible. In this way there is less chance of counting costs twice and you will avoid going into too much detail.

For example: it is easy to find prices for many operational costs such as security and cleaning services. It is better to include these estimates in an “all-in” part of the PPC than to make separate estimates for each of the sub-elements for these services such as personnel costs, materials, management, administrative overhead and insurance premiums.

3. One price level

All costs are estimated based on one price level, for example prices at 1 January 2002. Amounts estimated for after 1 January 2002 are indexed for inflation. These amounts are later converted to the present value using a nominal discount rate. You do this when you create the cash flow projection.

4. Methods for estimating costs

The PPC team can use some of the following methods for estimating costs:

- consultation with those people directly involved in the project. These people can help in explaining specific aspects of the project;
- interviews with and research by other internal or external experts. The internal experts are usually project leaders and project estimators. External experts include construction cost experts, maintenance specialists, and surveyors;
- desk research (research projects and evaluations carried out by universities, audit departments, The National Audit Office at home and abroad etc.) This research is usually the cheapest form of investigation but it has the drawback that you must interpret other people's research;
- reference projects, the PPP Knowledge Centre can help here;
- expert panels, it may be useful to hold an expert panel session, especially where the boundaries between the various disciplines are vague, for example the relationship between reinvestment and maintenance within the project.

5. Hidden costs

(See as well Step 2b)
Many estimates are made based on similar projects. Estimates were made for these projects and the actual costs for preparation, transaction, construction and development are known. Remember that the "hidden costs" have probably not been allocated to the project but they have actually been incurred specifically for the project concerned. An example of such costs is the expenses for design and management which have been charged to the organisation (ministry) but not actually allocated to the project itself. You must also try to find these costs because they are relevant to the comparison with the PPP procurement.

6. Estimating income and risks

Traditionally there is much expertise among estimators concerning the initial investment costs. However, other specialists are required with knowledge about income and risks.

When estimating the income, income items should only be included if they are relevant to the public procurement option. These estimates are therefore based on previous projects or on expected project income and not on potential estimated income.

Estimates of the risks involved are made in two steps:

- you elaborate on the allocation of risks made earlier between the public commissioning authority and the various private parties who are involved in the project. An example is the allocation of the risk that an incomplete design is supplied by a firm of consulting engineers. This can result in extra construction costs coupled with a debate as to who is responsible for these costs - the commissioning authority or the constructor;
- then you elaborate on the risk analysis itself. Appendix B describes how you approach the risk analysis. The kind of risk does not differ between the two procurement options but the difference lies in the allocation and the level of the risk. As mentioned earlier, the party who is best capable of bearing and managing the risk will require the lowest fee for doing so and should get the risk allocated.

Creating a risk analysis can be a time consuming and complex process. The PPC team leader must decide how detailed the risk analysis should be for the PPC project and how much time should be spent on creating it. This will depend on how complex the project actually is (see also Appendix B).

7. VAT and corporation tax

VAT and Corporation tax are only included in the PPC if there are clear differences in the levels of tax between the two procurement options. The PPP Knowledge Centre can help you here.

8. Project rate of process

In the PPC you assume the same quality and time for the completion of the project for each procurement option, which will have its own project plan and thus risk of exceeding the allotted time.

9. Second opinion

The PPC team makes the estimates, if necessary in conjunction with other project planners, estimating specialists and project managers. If there are considerable differences in opinion amongst the team members concerning the estimates, then it may be useful to enlist other specialists to give a second opinion.

Output

- List of preparation costs (Example 3);
- list of transaction costs (Example 4);
- list of realisation costs (Example 5);
- list of exploitation costs (Example 6);
- list of possible sources of income (Example 7);
- list of risks (Example 8).

Step 3b: quantify the differences between the public and PPP procurement options and list the costs, income and risks for a PPP procurement

The project costs, income and risks for the PPP procurement option are estimated in this module. Your starting point is the work carried out in Module 2b taking into account the points mentioned in 3a. However, the approach taken in the Quantitative analysis for the PPP procurement differs from the approach taken for the public procurement option.

Approach PPP analysis

The approach in this module is not to estimate all the relevant cost elements again but to estimate the differences with the public procurement option. You do this in two steps:

1. Quantify the analysis of the differences identified in Module 2.
2. Calculate the costs, income and risks for the PPP procurement option by relating the differences to the public procurement option (=100%).

Sub 1. Quantify the differences

The items in the analysis of the differences made in Module 2 are expressed as a percentage of the estimate for the public procurement option. You can refer to existing PPCs for general experience on the differences between the public and PPP procurement options and also the initial PPP project bids received will help you to determine these percentages.

Appendix A contains an overview of this experience which can be used to assist in the valuation of the differences between the public and PPP procurement options. These rules have been drawn up following interviews with experts at home and abroad.

Sub 2. Calculate the costs for a PPP procurement

By using the quantified differences (in percentage terms), the values for the PPP procurement option may be calculated from the estimates for the public procurement option.

Added value

Added value is a separate category of income in the PPP procurement option. Added value opportunities are project–related, and examples include:

- improved coordination between design and realisation;
- purchase and sale of materials;
- alternative uses for fixed assets or mobile construction plant. An example is a school building that may be used during the day for school lessons and in the evening is rented out as an adult education centre. This additional income is inherent to the commercial approach of the PPP procurement option and must be included in the list of costs and income;
- improved management of cash flow, whereby less operating capital is needed;
- innovations in the project which results in a higher residual value.

Usually these cost savings and income elements are found in the cost and income categories mentioned earlier. If not, then they can be added separately to the cash flow chart.

Risk analysis

In some cases creating the risk analysis for the PPP procurement option is even more time-consuming and complex than for the public procurement option. It is a part of the PPC which, if the decision is made in favour of a PPP tender, will also be part of the Public Sector Comparator (PSC) and will be needed during the negotiations with the bidding consortia. All the effort put into the risk analysis now will be a saving later when the PSC is drawn up. The PPC team must decide how much time should be spent and how detailed the risk analysis should be in this phase.

Output

- Quantified differences in costs, income and risks (Example 9);
- overview of preparation costs (Example 10);
- overview of transaction costs (Example 11);
- overview of realisation costs (Example 12);
- overview of development costs (Example 13);
- overview of possible income (Example 14);
- overview of the risks (Example 15).

Step 3c: draw up two cashflow charts, calculate the present value and draw the comparative matrix

In the previous two parts of this module the costs, income and risks have been estimated for both for public and PPP procurement options. In the last part you take two further steps:

1. the values of the various costs are entered into the cash flow chart;
2. the present value of the costs is calculated and entered into a matrix.

Sub 1. Cash flow analysis

For the valuation of the values one price level is assumed which is then indexed with a fixed percentage for inflation, depending on when the cost, risk or income will actually take place. The PPP Knowledge Centre's financial adviser can help you to determine the correct indexation.

You will begin to understand the financing required by listing the cost, risk and income elements in the cashflow chart. There are separate cashflow charts for the public and PPP procurement options. The cashflow chart should have the following characteristics:

- the chart begins on the date on which the project preparation commenced;
- the chart ends of the date on which the PPP development contract will terminate. The same termination date is also used for the public option.

- the chart shows net amounts per period. This means that the expected income is deducted from the expected costs and risk;
- the amounts are indexed from one price level. This is usually the price level from year zero (t=o), or when the tender preparation started.

Examples 16 and 17 show cash flow charts for both the public and PPP procurement options.

The same experts who helped to make estimates earlier in the project, also make assumptions concerning costs, income and risks in the future. They help the PPC team with this task.

Sub 2. Calculate the present value

Funds which are spent now have a different value than if the money were spent next year. By calculating the present value you can deduct the value of future cash flows at any point in the projection.

You do this in the following two steps:
a. discount the net amounts over time (see previous step);
b. calculate the (net) present value.

Step a. Discount the net amounts over time (see previous step)
The discount rate takes into account the reduced value of money due to inflation, timing and risk. The discount rate also reflects the market perception of the project risk. Experts, such as the PPP Knowledge Centre can help you to determine the correct discount rate for your project. The same discount rate is used for both the public and the PPP procurement options.

Each (net) amount is divided by the discount rate for the year in which the amount occurs. The formula to calculate the present value is as follows:

$$\frac{C(t)}{(1+d)^t}$$

C(t) = the costs in the year t, indexed for year t.
d = the discount rate (percentage)
t = year

Step b. Calculate the (net) present value
You can now calculate the present value of the project by adding up all the discounted amounts. You do this for both procurement options.

The formula for the total present value of the project is as follows:

$$PV = \sum_{t=0}^{n} \frac{C(t)}{(1+d)^t}$$

PV = the present value
n = the number of project years
C(t) = the balance of costs and income in the year t, indexed for year t
d = the discount rate (percentage)
t = year

A project with costs of € 100 in year 0 and € 102 (=100 x 1,02) in year 1, with a 6% discount rate, has a present value (PV) of:

100 + 102/1,06 = 196

Note: The cash flow in year one is indexed by 2% for inflation. You can therefore use a nominal discount rate (including inflation).

Matrix
When the present values have been calculated, you put these in a matrix against each other. This matrix will form the basis for the conclusions and recommendations which you will make in the following module.

Output
Calculation of the present value for the public and PPP procurement options.

Example

Step 3a: draw up a list of the costs, income and risks involved in a public procurement

Together with her team and following consultation with various experts, Taske has estimated the preparation costs (see Example 3), the transaction costs (see Example 4); the realisation costs (see Example 5), the exploitation costs (see Example 6), the income (see Example 7) and the risks (see Example 8). Help was especially welcome from the project planners and estimating specialists from within RWS. Taske emphasises that this concerns all costs and income during the complete project life cycle which runs from 2002 to 2033 a period of 31 years.

Costs
Taske makes an inventory of all costs which the project will incur during its life cycle. She makes a brief explanation for each entry and where necessary refers to the different documents. Taske clusters the costs into the appropriate cost categories: preparation; transaction; realisation and exploitation. Taske uses the price level at the end of 2002.

The quantification of the realisation costs is explained in more detail below. Taske uses the same method for quantifying the other costs.

Taske discusses the design and construction costs or realisation costs with a project planner, a cost expert and a project leader from a similar project which has already been completed. In addition to these experts Taske also refers to a report written by the RWS internal accounting service concerning the reliability of the estimates made for the construction of a similar project in England. She arrives at an estimate for the design costs in two ways, Firstly, as a factor of the construction costs (4%) and secondly, based on an estimate of the hours spent by the designers, both internal and external (= hidden costs). There is much discussion surrounding the so-called hidden costs. Taske decides to describe all the internal man hours (20 000 hours x € 100 per hour) and material costs (€ 1,000,000) which are incurred in the public

procurement option. This identifies the time spent by the internal design department as well as the cost of providing offices and other facilities for these people. Takse has explained this calculation in a supporting document.

Taske estimates the costs for obtaining the land, preparing the ground for construction, the construction of the tunnel and the construction of the road in the same way. She verifies her estimate based on the expected time and materials usage by rule of thumb. There are no hidden costs during the construction phase.

Taske assigns nominal amounts to the risks identified earlier which apply to the realisation phase. These nominal amounts can be updated at a later stage. Using all the data available Taske draws up a list of all the realisation costs up to 2033 (see Example 5).

To complete this step, Taske organises an expert session during which the PPC team and several internal and external experts analyse all the costs, income and risks identified. Where necessary they can recommend that a second opinion be obtained to clarify one or more parts.

Income

During the brainstorming session, members of the PPC team came up with all kinds of potential sources of income. Taske only includes those income amounts in the PPC calculation for the public development which can realistically be achieved. Taske does not include the other potential sources of income mentioned in her calculations.

Together with the costing experts from RWS and an external expert, Taske decides to include in the estimates the income from sale or rental as well as income resulting from the residual value of the assets (example 7). The income from sale refers to the disposal of excess land. Some land must be purchased which will only be needed for a short period of time for access to the construction site, after which it can be resold. This is 9600 m^2 of land and it has a market value of € 125 per m^2. The transport services will probably want to rent space at the entrance to the tunnel to function as a storage and service area. This is 2200 m^2 of land and has a rentable value of van € 112.50 per m^2. The residual value of the road, including the tunnel and safety systems is estimated to be € 27.5 million. The background to these calculations is included in the appendices.

Risks

During the brainstorming session the risks which were identified during the Qualitative analysis stage are analysed further. Besides the PPC team members, Taske also invited some experienced risk analysts from the RWS organisation. Taske also enlists the support of an external risk analysis expert for this session. In the previous step seven risks were already identified (Step 2b).

1. Risk of disappointing results of the bid process;
2. risk of the preparation taking more time than expected;
3. risk of problems in the planning phase;
4. risk of the design being incomplete;
5. risk of extra costs during construction (realisation);
6. risk of delays during construction (realisation);
7. the risk of higher costs for maintenance (higher costs for management and maintenance).

During the discussions, an eighth risk was added to this list:

8. risk of unfavourable ground and soil conditions.

The allocation of these risks for the public procurement option has already been described in the Quantitative analysis stage. Takse now values the risks listed using information gained from meetings with internal and external experts and studies of the National Audit Office. She takes the presupposed allocation of the risks made during the qualitative analysis stage into account.

Taske concludes that all the risks have an influence on the costs and income in the public procurement option because in this case, the risks are totally or partially to be borne by the public commissioning authority.

Taske writes a short explanation of the valuation of each risk. For a more substantiated explanation she refers the reader to other documents or to the appendix.

- The risk of disappointing results of the bid process lies with the public commissioning authority and this is estimated by the experts at 2% of the realisation costs (excluding design costs).
- The chance that the preparation phase will take longer than expected and the effect on the cash flow is estimated to be negligible.
- The chance of problems arising during the planning phase (25%) multiplied by the expected impact (€ 1 million) results in the risk value of € 250 000.
- The risk of the design being incomplete - which would result in extra costs is estimated at 20% with an effect of € 1.25 million on the cash flow. The value is then equal to the chance that it might occur times the effect it would have on the cash flow, thus € 250 000.
- The risk of extra costs during the realisation phase is estimated based on an evaluation study carried out by the Dutch Audit Office and an investigation into over expenditure carried out by the National Audit Office in the UK. Both studies show that the excess costs during the realisation of tunnels averages between 3% and 5% of the realisation costs.
- The risk of delays during the realisation phase is based on experience gained by organisation Y in similar projects and the potential delay is estimated at 3 months.
- The risk of unfavourable ground and soil conditions is calculated by multiplying the chance of this occurring (25%) by the impact (€ 3 million): risk value is € 0.75 million.
- The extra costs during the development phase can also be estimated based on documentation provided by the Dutch Audit Office and the UK National Audit Office: the average extra costs for tunnel construction are 2%.

Takse calculates the effect of these risks on the costs in Example 3 (risk of problems in the planning phase and of unfavourable ground and soil conditions), in Example 5 (risk of incomplete design, risk of extra costs and of disappointing results of the bid process) and in Example 6 (risk of extra costs). Two risks concern the project planning and are reflected as such in the cash flow chart.

Example

Step 3b: Quantify the differences between the public and PPP procurement options and draw up a list of cost, income and risk elements involved in a PPP development

Taske and her team start to quantify the differences analysed in Module 2 (Example 9). They then proceed to calculate the costs, income and risks for the PPP procurement option (Example 10 to Example 15).

1. Quantifying the differences

Taske and her team quantify the differences between the public and PPP procurement options which came to light during the Qualitative analysis. The results are shown in Example 9 (quantification of differences in costs, income and risks) and a list of references supports these calculations.

Members of the PPC team have had discussions with four industry experts and three experts from RWS. They have also consulted studies carried out by research organisations and universities in the Netherlands and in the UK. Where possible the team quantifies the differences identified in Example 2.

The team has therefore been able to conclude, for instance, that the estimate for the construction costs for the tunnel are about 10% less for a PPP development. This conclusion has been drawn from discussions with three engineering companies specialized in tunnel construction. Each gave their interpretation of the differences identified (savings on costs and construction time by integrating the design and construction phases, performance incentive due to the introduction of an availability premium, cost savings due to the transfer of risks). Engineering firm A estimated that a saving of 2.5% to 7.5 % was possible, while engineering firms B and C considered the potential saving to be 5% to 10%. This estimate was further analysed during a panel discussion with experts from the three engineering firms and two RWS project leaders. The panel saw no reason to revise the estimates. To support these estimates Taske also carries out some desk research, at this point she finds Appendix C of the PPC manual useful. Furthermore an evaluation

study, concerning tunnels built recently in the Netherlands, shows that the average budget overrun is 14%, of which about 6% is due to changes in the scope, 4% for additional design requirements and 4% is due to extra costs. A study carried out by a British civil engineering firm indicates that a DBFM contract for a tunnel in the UK can result in an average saving of 18%.

Taske decides to estimate the difference in realisation costs for the tunnel at 7% (the range is 2.5% to 10%). This difference between the public and PPP procurement option can be found in Example 9, together with the quantification of the other differences.

2. Calculation of the costs, income and risks for the PPP procurement option

Taske attempts to estimate the costs and income for the PPP procurement option using the quantification of the differences between the public and PPP procurement options made earlier in Step 3a. Taske would have liked to have estimates from other PPP developments for similar projects, but unfortunately these are not available.

Costs

Per project phase Taske writes a short description to support the estimate of the PPP procurement. The preparation costs (see Example 10) are higher than expected. Creating a detailed specification for the output is a new way of working and certainly for the first few PPP projects this takes extra time. It will often be necessary to engage external experts to support this process and to ensure that it is carried out properly. Taske estimates that about 5100 additional hours are required from external consultants, at € 200 per hour. This means more than € 1 million additional costs for project preparation. Taske assigns nominal amounts to the risks identified relating to the preparation phase (risk of planning problems and of unfavourable ground and soil conditions). These can be revised later.

Taske now has supporting arguments for the quantification of all transaction costs (see Example 11), realisation costs (see Example 12) and exploitation costs (see Example 13) involved in the PPP procurement option.

Income

Following consultation with an external expert, Taske concludes that the private parties will probably generate extra income resulting from the value of land development. She estimates that the private parties can generate about € 5 million by using the road surface for heat exchange (they already have the necessary know-how and licences). By using the ground next to the road to lay data communication cables they can also generate a further € 4.5 million income. These figures are based on price levels at the end of 2002. Again, Taske refers the reader to separate documents as appendices to the PPC for the supporting arguments.

Because the income from other sources (sale of the ground, rental and income based on the residual value) is identical in both procurement options, Taske can complete all the income in Example 14 for the PPP procurement option, including the amount for the change in land value.

Risks

Taske analyses the allocation of the eight risks identified for the PPP procurement option (see Step 2a: Qualitative analysis). The risks identified are valued following interviews with internal and external experts, studies and experience gained from organisation Y.

Taske concludes that the risk overrun of the preparation phase and of disappointing results from the bid process should be allocated in the same way for both procurement options. The allocation for the other six risks differs between the two procurement options as also the valuation of these risks.

- The chance that the design is incomplete in the case of an integrated design, construction, funding and development project is smaller

and is therefore estimated at 5%. Because the effect remains the same, this means that the value of this risk (chance that occurs multiplied by the effect on the cash flow) is € 62 500 lower.

- The chance of problems occurring in the planning process is slightly reduced because part of the risk now lies with the private parties and they have the incentive to prevent delays and extra costs.
- The risk of extra costs being incurred during the realisation phase is estimated based on research carried out in the UK where it transpires that the risk is managed better by the private sector. The average overrun of costs for PPP development of tunnel projects is between 2% and 3% of the realisation costs.
- The chance of the realisation phase taking longer than planned is based on experience gained by organisation Y with similar projects and is estimated at 0 months.
- The risk of unfavourable ground and soil conditions cannot be influenced by the responsible party. The chance that this might occur is estimated at 20%, marginally lower.
- Based on research data, extra costs during the exploitation and maintenance phase are estimated lower, at 1%.

Taske summarises this analysis in Example 15. Taske then processes the effect of these risks of the costs in Example 10 (risk of unfavourable ground and soil conditions), Example 12 (chance of extra design costs, risk of extra costs and chance disappointing results of the bid process) and in Example 13 (risk of extra costs).

Example

Step 3c: draw up two cash flow charts, calculate the present value and draw the comparative matrix.

Taske summarises all the cash flows in the public procurement option in the cash flow chart (see Example 16) and all the cash flows for the PPP procurement option in a separate chart (see Example 17). Finally she calculates the present value for all the amounts and enters these into a comparative matrix (see Example 18).

Create cash flow chart

Taske creates the cash flow chart for the public procurement option (see Example 16) by collating all the costs (Examples 3 to 6), all the income amounts (Example 7) and including all the risks. She then calculates the nominal cash flows including 2% inflation.

Taske creates a similar cash flow chart for the PPP procurement option (see Example 17) by collating all the costs (Example 10 to 13), all the income amounts (Example 14) and including all the risks. Here she also calculates the nominal cash flows including 2% inflation.

The net cash flow per year is calculated as the costs less the income for that year. By dividing the annual net cash flow by the discount rate for the year in which the cash flow takes place, the net present value is obtained. Earlier the PPC team agreed a nominal discount rate of 6% (actual discount rate of 4% plus 2% for inflation). Taske now applies this discount rate to the net cash flows in Examples 16 and 17. She applies the factor 1 to the cash flow in 2002 (base year), the factor 1 multiplied by 6% (=1.06) for 2003, and the factor 1.06 x 1.06 (=1.12) for 2004 etc. This is shown in Example 16.

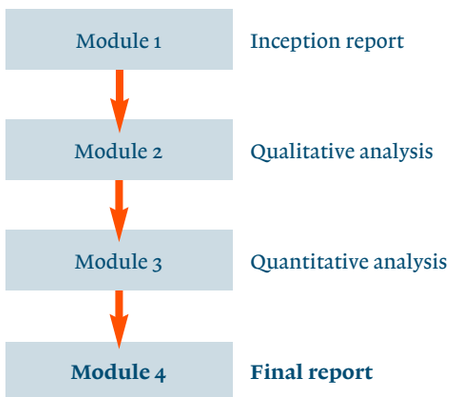
Create comparative matrix

Taske creates a comparative matrix by expressing the costs and income for both procurement options in terms of their net present value and presenting these together (see Example 18).

Taske uses this cash flow chart to calculate the difference in present value between the public and PPP procurement options: € 25.8 million. Taske discusses the matrix with the whole PPC team so that everybody understands the steps taken and has the opportunity to comment.

Module 4: Final report

4



Step 4a: explain the results

Step 4b: conclusions and recommendations

Purpose

The purpose of this module it to draft the Final report which briefly discusses the comparison between the public and PPP procurement options, presents the conclusion as to which option is the most advantageous, and makes recommendations for the following phases of the project.

Structure

The first part of the Final report discusses the action taken in the previous modules, and includes a summary of them. This summary is supported by relevant datasheets. The second part of the Final report contains the recommendations to the decision-makers as to which procurement option provides the most added value.

Preparation

The material assembled during Modules 2 and 3, now forms the basis for the conclusions. The results of Modules 2 and 3 are already documented and can be used when writing the Final report.

Output

The Final report can be completed within one to two weeks and should contain the following:

- a list of the most important differences identified (summary from the examples);
- an explanation of how the differences between the public and PPP procurement options have been valued;
- conclusions with recommendations for decision-makers;
- recommendations for the continuation of the project.

Step 4a: explain the results

The Final report begins with a short recap of all the steps carried out in of the previous modules and a brief summary of the results. This is discussed with the PPC team for final verification. The most important assumptions are also summarised. Then the results of the analysis in Module 3 are presented.

Output

Summary of the steps carried out:

- describe which steps were carried out and what the results were. For example you can describe here how the risks were identified and how the analysis of the differences took place;
- describe which steps were taken in previous modules and which problems were encountered.

Overview of the most important differences:

- the description of the differences between the public and PPP procurement options. This can be presented in a matrix with plusses and minuses to show the differences;
- explanation of the results.

The financial comparison:

- the financial overview of the cash flows for both procurement options;
- the comparison based on the present value calculation.

Step 4b: conclusions and recommendations

Based on the financial comparison, the PPC recommends the most advantageous procurement option for the project, public or PPP. It could be that the PPC shows that the public procurement option is most advantageous. Do not think then that the PPC has not been successful. Remember that the purpose of the PPC is not to demonstrate that private development is always more advantageous. The purpose is to make a fair financial comparison between the public and PPP procurement options.

The recommendations in the Final report focus on the subsequent phases of the project. The Inception report already described what should happen once the PPC was completed. Now you add recommendations about who should take further action, and when. If the PPC shows that PPP development is financially advantageous, then a PSC should also be made to support the PPP development. It is sensible to use the knowledge gained by the PPC team to draw up the PSC.

The project leader writes a draft Final report which can then be discussed with the rest of the PPC team. The definite version of the Final report is then written.

Output

Conclusion

Which procurement option, public or PPP, offers the most added value.

Recommendations

The PPC is not the final stage of the project. You indicate here what subsequent steps can be taken. If you conclude that the PPP procurement option offers the most added value then you can recommend that a PPP invitation to tender and a Public Sector Comparator should be prepared. You can indicate which people should be involved in the Public Sector Comparator working group.

Example

Step 4a: explain the results

In her Final report, Taske first describes the steps of the PPC investigation and then she goes on to explain the most important differences. She concludes this description with an explanation of the financial comparison which has been done in Step 3c.

Steps undertaken

Taske explains that after the Inception report was written, the team went on to use Qualitative analysis techniques to draw up list of costs, income and risks for the A101/A18 project. In this phase the project group was supported by an external consultant, who helped Taske to prepare two sessions to discuss and brainstorm about the differences between the public and PPP procurement options. During these sessions other experts were also involved to further elaborate on both procurement options and to assist with the discussion about the value of early completion of the project. The differences which the project team identified were assessed for their effect and Taske has verified these estimates in discussions with internal and external experts. The project team were unanimously in favour of continuing to draw up a Quantitative analysis.

During the Quantitative analysis the project team also used internal and external experts to help quantify the costs, income and risks in the public procurement option. Where relevant, the estimates are explained in an appendix or in separate documents. The estimates for the costs, income and risks involved in the PPP procurement option were estimated by quantifying all the differences identified in the Qualitative analysis and relating these to the costs, income and risks involved in the public procurement option. The Quantitative analysis was concluded with a comparative matrix.

Overview of the most important differences

The most important differences between the public and PPP development of the A101/A18 project are described in Example 2. These differences are quantified in Example 9 and an explanation is given in the text. The most important differences concern the estimate of the

realisation and exploitation costs. These differences can be explained by the integration of the design, construction and exploitation, the focus on the complete project life cycle, payment based on availability and the transfer of risks.

The financial comparison

The PPC is summarized in Example 18. The PPC supports the comparison of the costs, income and risks between the public and PPP procurement options for the A101/A18 project as shown in Example 18, expressed in terms of the net present value at the close of 2002. This shows that on the one hand the public procurement option is slightly cheaper so far as the preparation and transaction costs are concerned. On the other hand the PPP procurement option is considerably cheaper when it comes to the realisation and exploitation costs and in this case there is a considerable increase in the project value.

The PPP development results in a financial benefit of € 25.8 million on a total investment of € 250.6 million for the public procurement (Net present value 2002). Using the same output specification and uncertainties and based on the information Taske now has at her disposal, a possible saving of € 25.8 million is feasible if the decision is made to tender the project as a PPP.

Example Step 4b: conclusions and recommendations

Based on these results Taske recommends the PPP procurement option as this has clear financial advantages and she makes several recommendations so that the A101/A18 project can effectively be started.

Conclusion:

The most advantageous procurement option for the A101/A18 project is the PPP procurement option.

Recommendations:

Taske formulates several recommendations:

- present the results of the PPC, supplemented by non-financial arguments to those responsible for the project;
- the output specification should be developed in more detail;
- investigate whether there is sufficient private interest for the A101/A18 project;
- prepare the PPP Invitation to Tender;
- start work on a Public Sector Comparator soon, Taske recommends that advantage should be taken of the knowledge already gained within the PPC team.

Appendix

A

Appendix A: checklist of differences between public and PPP procurement options and quantitative overview

Arguments in favour of PPP

1. Risk transfer

Important gains can be realized by allocating risks to private parties who are better at managing them than by bearing the risks as a public authority. In particular, transferring the risk of exceeding the initial investment budget, or the maintenance and management costs, as well as the risk of technological obsolescence appear to create substantial cost savings for the public authority.

The questions that the project team must ask itself in every project are:
- which substantial risks should the public authority bear and
- are private parties better equipped to bear and manage these risks (and why)?

2. Output specification

Until now, the public authority has always dictated how the project will be carried out. Often, detailed descriptions are made of what input is required in order to arrive at the desired project result. In the case of an output-based specification the public authority describes exactly what is required. The output requirements are fixed, while the private partners can be as creative as they wish with the inputs so long as the specified output is achieved in terms of quality. In the United Kingdom, this approach has resulted in considerable benefits and there are increased opportunities for innovation and cost savings.
There is a danger that if the output definition is too precise, this defeats the object of the exercise. Another potential danger is mis-specification. A lesson to be learned from previous projects is that an output specification can be a very important factor, but that it is certainly not a universal remedy.

The project team should ask themselves which output is actually required, and whether it is possible to specify this in such a way that the private parties are given room to manoeuvre in terms of cost savings and innovation (how and why).

3. Long-term agreements

Research shows that public authorities tend to opt for a higher quality in the initial investment phase in order to keep the maintenance costs to a minimum. This results in relatively high costs when measured over the total life cycle of the project, because higher costs early in the life cycle are more expensive than extra costs in the longer term. On the other hand, it might be that public authorities opt to keep the initial investment as low as possible in the hope that somewhere along the line, once the project is complete, a solution will be found for the relatively high cost of management and maintenance.

The reasoning behind a long-term agreement is that this provides an incentive for an integrated approach to the project design and development and results in a durable product. The focus on costs during the complete life cycle can be of great influence on the specification of the assets and the planning and realisation of maintenance and management.

The project team should ask themselves what the ideal contract length is for the specific project and why. For example the contract length in the ICT sector will be considerably shorter than for a project in the real estate sector.

4. Performance measurement and inbuilt incentives

Performance measurement and relating the measured performance to the payment mechanism, for example, is a method which will certainly prove itself in practice. Considerable benefits can be achieved in the long-term by considering in the initial stages of a project, within the specific project context, how the output can be measured and what incentive can be created to stimulate the provider of the products and services to perform well.

5. Competition

It is important to guarantee competition between the suppliers of products and services. When there is sufficient competition between suppliers, market conditions will force them to deliver improved performance. This can either be in the form of a more competitive price, or in the form of improved quality.

In an ideal situation, there is not only competition between suppliers, but also among the commissioning authorities. We imply here that when there is a sufficient flow of deals for similar projects, those bidding will be prepared to offer competitive prices in order to be awarded a strategic assignment. This element can also increase competition. The project team should take into consideration whether there are sufficient potential bidders for a given project context, or whether these can be arranged. The team should also consider whether a sufficient flow of interesting deals can be created which, in turn, will provide stimulation for private parties to be even more competitive in their bidding, in order to gain a position in a developing market. The most important hindrances to generating clear differences between the bidding parties are the high price of admission (costs incurred the bidding party set off against the chance of success) and the lack of prospects for a steady flow of deals.

6. Management expertise of private parties

Private parties have more managerial expertise. This is a well used argument, which has almost become a cliché. Even so, research carried out in the United Kingdom shows that indeed there are efficiency gains to be made by allowing certain tasks to be executed by private parties. For example, private parties can achieve efficiencies of scale, they have core competencies in some market sectors or are able to develop innovative applications. In practice this frequently seems to lead to benefits when compared to the public authorities. It is certainly worth considering hiring in private parties for work in very dynamic markets (ICT sector) or for exceedingly specialized services.

7. Innovation

The creativity and enterprise drive of private parties is stimulating and needs to be stimulated in order to arrive at innovative solutions. This can be a new way of looking at things, a new approach or a new technique. There are two important pitfalls concerning innovation. First of all the private sector is often inclined to work with proven techniques and solutions. When all risks are transferred to the private party, there is little inclination to experiment. Secondly, innovative solutions usually have consequences for the way the project is set up or for the project context. Consider creative solutions for building a road where the route or a planned bridge are changed. This has such enormous consequences for the planning procedures that this type of innovation could throw the whole project plan into confusion.

8. Expertise bundling

In the United Kingdom it is evident that the combination of internal and external expertise is a very important factor. Because a public-private partnership usually involves large projects, management will free up their own time as well as that of the best members of staff, and the teams are usually supplemented with specialized external consultants. This bundling of expertise helps during the preparation of the bidding process, which, just as with other elements, can result in clear benefits.

The question which the project team must ask themselves is whether enough expertise is mobilized and motivated to commit themselves to the project.

9. Existence of the PSC

The fact that the parties know that the public authority will draw up a well thought-out Public Sector Comparator (PSC) as a benchmark for the private tenders ensures that the bidders think carefully about their tender. Otherwise their effort in bidding will be wasted. In the United Kingdom many project managers consider the very existence of the PSC to be an important factor in bringing the differences between the public and private parties to light.

10. Transparency in the process

In many cases, if the level of transparency is high, this will give the competition an impetus and in any case this makes the optimal allocation of risks easier.

11. Deal flow

If there is a considerable and steady flow of potential deals, then more market players will enter the bidding process and they will be more interested in this process. This will automatically lead to more efficient bids with lower margins, a reduction in the learning curve and its associated costs for the private bidders and a reduction in their average cost of taking part in the bid process.

The project team must ask themselves whether enough market potential can be generated, so that a sufficient number of competitive private bids will be made.

12. Realising value in hidden assets

Often private parties are more creative in realizing additional value in assets which was not previously evident. This may involve utilising excess capacity or an alternative use for an asset. Consider the use of the road, or rather the road surface to store heat from the sun. This had not before been considered as a realistic secondary usage for a road (other than as a surface for vehicle transport), but a considerable cash flow can be generated by exploiting such an asset.

The project team should ask themselves whether there are hidden assets and which party is in the best position to exploit them. Depending on the sort of asset, the public authority or the private party will be in the best position to market it. If it concerns excess capacity in a building, then it would be obvious to consult a real estate project developer. In the case of an alternative application for the road surface an energy company or a specialized firm of civil engineers would be the first port of call.

13. Project bundling

Economies of scale can be achieved by grouping projects or parts of projects together. In most cases a project is split into smaller parts, which can then be worked on separately. The advantage here is improved management, but the disadvantage might be that coordination with other parts of the project becomes more difficult. An integrated approach over the complete project life cycle is even more complicated but has the advantage that the cohesion of the complete project is strengthened and that considerable economies of scale can be achieved.

The project team must ask themselves right at the start whether there are potential economies of scale to be gained in this specific project context. They should also consider how the balance between complexity and cohesion falls and who is best placed to manage these considerations.

14. Involvement of financial institutions

The involvement of a financial institution (usually a bank) means that extra attention will be paid to covering and managing risks. Financial institutions are experts in this area. In the United Kingdom, the involvement of financial institutions has given an impulse to risk management within projects, even though the effect was not as great as many had originally expected.

The project team must investigate at the outset how risk management can be improved within the project and whether the involvement of financial institutions is beneficial.

15. Long-term partnership

The process is not complete when a contract between the public authority and the private parties is signed; it is only complete when the contract is formally ended. In many public-private contracts detailed working agreements are included, so that frequent and open communication is possible. Explicit monitoring and reporting requirements provide the incentive to work as economically as possible in the long-term.

The project team must investigate which agreements are needed for the long-term so that the incentives actually mean that the contract partners provide extra value for money.

Arguments against PPP

1. Higher transaction costs

The private approach to a project, based on a concession or other form of cooperation, generally leads to higher transaction costs. The private sector bidders incur high costs for their detailed bid preparation. Either the bidders receive a fee to cover most of the costs incurred, or they must earn this back within the future assignment. This irrefutably leads to higher transaction costs.

In addition complex processes such as PPP usually require many external consultants, which can also increase the costs.

2. Increased complexity and dynamics

Grouping subprojects over time increases the project complexity. The increased contract length (mostly design, construction and maintenance) also leads to increased complexity for the negotiations and the text of the actual contract. Additionally, looking far into the future adds extra uncertainty.

This increased complexity often means that the commissioning authority uses extra man-hours, sometimes external, and that the preparation period is longer. However, these costs are incurred only once, in contrast to the usual multiple-project approach.

3. Lack of potential bidders

The biggest danger for a complex project is that there are insufficient market players interested enough to make a bid. This might be because they consider the cost of bidding to be too high, or because they simply don't have the capacity to make the bid. If there are insufficient potential bidders, then there will not be an optimal price structure, from the public authority perspective, because market forces will not be able to work properly.

The project team should consider at the outset whether there are parties interested in carrying out the project and if so who they are.

4. Complexity of implementing policy

It can be more complex for a public authority responsible for managing a network or implementing public policy when there are many contract parties involved.

Controversial arguments against PPP

1. The government has the lowest cost of capital

A common misunderstanding is that the government can borrow money cheaply, because it is the government. When financing projects, the project is the focal point and not the party carrying out the project. The capital costs of projects are determined by the specific project risks and not by the source of the capital.

Interest rates paid on loans taken out by the government are indeed lower than the rates paid by financial institutions (inter-bank interest rates) and these rates are considerably lower than interest rates paid by private companies for investment loans. But that is not because it is the government, company X or bank Y making the loan but also because of the differences in risk borne by the parties concerned. When the government finances a project, the government bears many risks. Some of the risks have been identified, and part of the project budget has been reserved to cover these risks. Many other risks are taken as they arise. The capital markets can lend money to the government relatively safely, because there is always sufficient contingency funding to cover setbacks. For banks and companies there are more risks to be borne and these can have considerable repercussions for the repayment of loans to the financiers. Providers of capital therefore require a higher risk premium.

A good illustration of the statement that the cost of capital is determined by the risks and not by the source of funding, are governments in emerging markets. The Russian government pays higher interest rates on dollars which they borrow on the international capital markets than the Dutch government would pay. This is logical, because the risks run in lending to the Russian government are considerably greater than when they are in lending to the Dutch government.

2. The project seems unfeasible, let's try PPP

It happens all too often that a project which is not properly set up and is therefore almost impossible to finance, is nominated as a PPP project. The PPP formula is then intended to facilitate funding the project. However, a poor project remains a poor project. The most you can expect is that input from a private party will bring about changes in the project. Changes in project scope or the approach to the project could mean that it becomes feasible. It is not the PPP route, but the changes in the approach to the project which help.

3. The Netherlands accepts foreign bidders, but bids from Dutch companies hardly ever get accepted abroad

There is always a certain degree of reservation in the bid process for large projects if there are dominant non-Dutch companies active in the market. Luckily there are Dutch private companies who have gained experience over the past few years in foreign markets with public-private partnership projects, so that these companies can use their experience gained to bid for Dutch projects. Besides, Dutch companies can also benefit from the experiences in public-private partnerships in other countries, the United Kingdom in particular. The management of the project and maximising opportunities created by it are key. Indirect considerations such as the possible importance to the Dutch business community are improper and controversial.

Quantitative overview of the differences between public and PPP procurement option

Table 1 Initial values of hidden costs

Sector	hidden costs	percentage	dimension	remarks
road	equipment costs (overhead)	0 to 1%	estimate	will differ per project
	deviation from estimate			for PPP in later phase and medium sized
	market effect	-8 to 0%	estimate	
	budget overrun	0 to 5%	tender	
	time overrun	5 to 10%	estimate	
rail	equipment costs	0%	estimate	based on interviews
	deviation from estimate:			
	budget overrun	0%	estimate	
	time overrun	0 to 5%	estimate	
location development	equipment costs	0%	estimate	based on interviews.
	deviation from estimate:			
	budget overrun	0%	estimate	
	time overrun	0 to 5%	estimate	

Sources:
-specification analysis and interviews with RWS;
-interviews with parties involved in the rail sector;
-interviews with Dutch local government.

Table 2 Initial values for efficiency

sector	percentage efficiency`	dimension	remarks
road	10 tot 30% 10 tot 20%	construction costs maintenance costs	based on the DBFO concept based on the DBFO concept
rail	10 tot 30% 10 tot 15%	construction costs maintenance costs	based on the DBFO concept based on the DBFO concept
location development	10 tot 30%	construction costs	based on a PPP in the begin phase

Sources:
- NAO; The private Finance Initiative: The first four DBFO Roads contracts (1998);
- interviews with the NAO and the Highways Agency;
- interviews with private contractors in the United Kingdom, who were involved in two DBFO contracts;
- interviews with contractors in the Netherlands;
- interviews government organisations in the Netherlands (RWS, local government);
- Dutch private bids.

Table 3 Initial values transaction costs

party	transaction costs	percentage	dimension
government	preparation costs monitoring	1 tot 2% higher -1 tot 0% lower	estimate estimate
parties bidding	tendering tendering including negotiations	0,5 tot 1% higher 1 tot 3% higher	estimate estimate

Source: interviews with parties involved in the Netherlands and in the United Kingdom.

Table 4 Initial values transaction time

sector	transaction time	percentage	dimension	source
large-scale infrastructure	6 - 12 months	5 to 15%	project time	valuation of time, based on the financial flows in the economic cost benefit analysis
location development	6 - 12 months	5 to 20%	project time	valuation of time, based on the financial flows in the economic cost benefit analysis

Source: interviews with parties involved in the Netherlands and in the United Kingdom.

Table 5 Initial values construction time

sector	construction time	percentage	dimension	remarks
road	6 - 12 months	5 to 15%	construction time	more or less compensates for the extended preparation time
rail	6 - 12 months	5 to 15%	construction time	
location development	0 - 18 months	0 to 20%	project time	

Source: interviews with parties involved in the Netherlands.

Table 6 Initial values for capital appreciation

sector	capital appreciation	dimension	remarks
road	0 to 1% higher	estimate	
rail	0 to 1% higher	estimate	
location development	0 to 25% higher	estimate	

Source: interviews with parties involved in the Netherlands and in the United Kingdom.

Appendix

B

Appendix B: risk analysis

1. Introduction

Risks form an integral part of every project. In this manual, risks are defined as the uncertainty of the income and expenditure involved in the project, ie the range of possible outcomes. Before the final financial comparison between the public and public-private procurement option can be made you need to understand the kind of risks involved and their size. Risk analysis is the tool to use. Depending on the information available and on the size of the project, you must decide, together with your project team, whether a global analysis is sufficient or whether you need a more detailed analysis.

2. Types of risk

Public authorities base their cost and income budgets largely on estimates which are multiplied by a risk factor for uncertainty in decision-making or knowledge, and for other measurable risks. In addition budgets will usually contain an amount for "project contingency" and an amount for "contingent events" to cover themselves for the consequences of any specific events within the project which cannot be charged to other parties, such as the commissioning authority or an insurer.

Most estimates made by public authorities - such as the estimates made by RWS according to the method for estimating infrastructure projects (PRI) - do not contain all the risks which private parties include in their bids. When drafting a PPC or PSC it is advisable to have a risk analysis available which includes all possible risks. The risk analyses currently available, which were drawn up for DBFO contracts, distinguish between pure risks and spread risks.

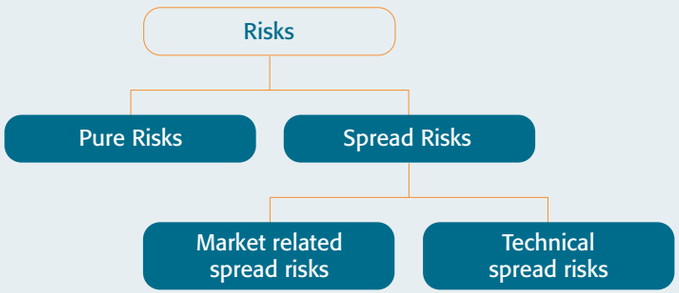
Pure risks

Pure risks are specific events which may occur during the construction or operation and maintenance period and which can have a negative influence on the net balance of the expected revenues and costs of the project. An example is the risk of heavy rain or hail storms which delay construction and which subsequently lead to higher costs. The value of such a risk is calculated as the chance that the event might occur multiplied by the financial consequences should it occur. The valuation of these risks is added to the estimated costs. In this way the pure risks are made visible in the charts containing the expected cash flow.

Spread risks

Spread risks are those risks concerning the uncertainty surrounding the estimated amounts and the pure risks. To a large extent, spread risks are linked to the macro-economy, and to a lesser extent they are also linked to the uncertainty of the technical estimates, or the uncertainty of the estimated prices and quantities. We can therefore consider market-related spread risks and technical spread risks. Experience demonstrates that the market-related spread risks are greater than the technical spread risks.

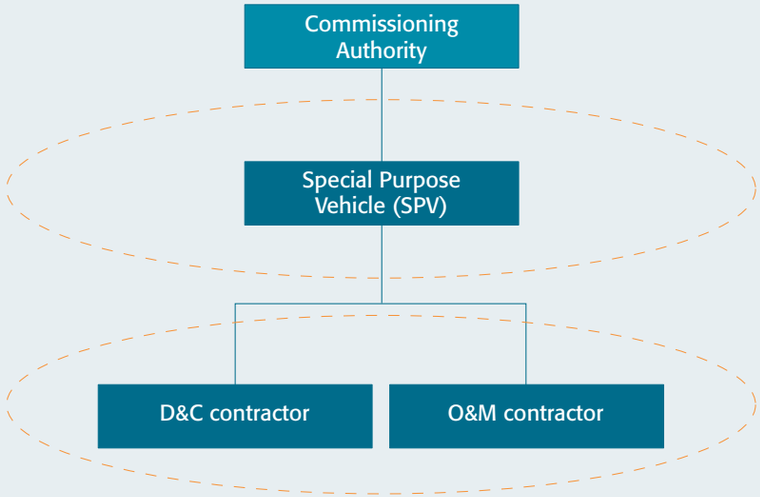
Figure 1: Methodological categorisation of risks



In a DBFM/O construction, a consortium will usually set up a Special Purpose Vehicle (SPV or Special Purpose Company, SPC) which will contract with one or more sub-contractors to realize the project. A further sub-contract with another company may allocate responsibility for the exploitation (maintenance and management) of the project. In these contracts a large proportion of the risks are transferred from the SPV to the contractors, especially those risks related to direct costs.

This primarily relates to the technical spread risks and the pure risks, and to a lesser extent to the market-related spread risks. The SPV bears some of the risks itself, namely those market-related spread risks and some pure risks which are less manageable and therefore less easy to transfer, and which in a public procurement option would largely remain with the commissioning authority.

Figure 2: Market related organisation structure



3. The valuation of risks

There are several ways to calculate the value of risks:
Using the risk matrix, the pure risks can be listed and the corresponding values of these of these risks can be included in the cash flow chart. Paragraph 4 discusses the construction of the risk matrix in more detail.

The technical spread risks can be valued by using the values in the risk matrix (pure costs) and by calculating other technical risks such as price fluctuation for items such as land and labour which are relevant to the project. An alternative is to use one risk factor for all spread risks together and this value can then be treated as a probability density distribution. The probability that the cost of a particular risk turns out to be higher than the estimate is 50% and in the case of a normal distribution this is the same as the average. If the parties wish to reduce the probability of exceeding the estimated costs then they can take a value in the 84% to 90% range. This means that the value of the technical spread risks is the same as the price difference between the 84% and 50% values.

The market-related spread risks can be valued in two ways: the benchmark method and the cost of capital method. When the benchmark method is used, the risk factor that the financial markets would use for these risks (including the technical spread risks) is determined by studying the risk factors applied to similar projects. When the cost of capital method is used, the factor that the capital markets would apply to the non-insured (business) risks is calculated based on the average yield required for the total project life cycle. By comparing the results of both methods an estimate for the maximum risk factor to be applied to the market-related spread risks can be made. Paragraph 5 discusses this in more detail.

We advise using both methods to provide greater certainty on the outcome. In order to reduce the possibility of miscalculating it is best to use as many different methods as possible and to compare the results. If the calculation of the same risk is a lot higher or lower by a different method, then the reasons should be investigated. We also recommend using consultants with experience in risk valuation. The PPP Knowledge Centre can provide you with a list of experts in this area (in the public as well as the private sectors).

4. The valuation of the pure risks using the risk matrix

Using the risk matrix you will gain insight into the pure risks related to the project as well as the technical spread risks, for example price variations. In Paragraph 4 of this manual the valuation of pure risks using the risk matrix is discussed. Technical spread risks are spread in Paragraph 5. This means that price fluctuations are not included in the risk matrix.

The risk matrix is constructed in several steps. The risk matrix should always be used for the valuation of the pure risks. As we discussed earlier the risk matrix can also be used to calculate the value of individual spread risks.

The sequence of the steps to be taken when constructing the risk matrix is important, and should be followed as described. This appendix gives a fictitious example which will help you when you are making the risk analysis for your own project. The steps to follow are:

a. draw up a list of the risks;
b. categorize the risks;
c. determine the global risk allocation and make a selection of the most important risks;
d. estimate the size, impact and probability of the risks;
e. assess the interrelationships (and correlations) of the risks you have defined;
f. draw up a risk matrix;
g. determine the probability distribution;
h. study any possible correlations;
i. calculate the value of the risks;
j. present the results.

a. Draw up a list of the risks

In previous parts of the project, overviews of risks have already been drawn up. You use these overviews in the first step where you identify all conceivable risks that might be relevant to your project. There are two important considerations when drawing up this risk overview. First of all, the list is never complete. This is a continuous process, where you keep coming back to reconsider whether you have forgotten any possible risks. Secondly, it's important to take all conceivable risks seriously.

Creating this risk overview can be a complex exercise, especially for larger projects. Techniques such as holding a brainstorming session can be an important means to identifying all conceivable risks. At this stage of the risk analysis it is important to actually identify all conceivable risks. Involve in your brainstorming session or risk analysis working group as many experts as possible from within and outside your own organisation.

Possible participants are financial, economic, legal and technical experts, and people who have been involved in similar projects. In short, involve all people who can assess the risks related to their own specialist area and who have some practical experience. If possible try to use checklists and experience from reference projects. As we mentioned earlier, the PPP Knowledge Centre can provide you with information and put you in contact with those people who were involved in the risk analysis for other projects. You may even be given access to existing risk analysis reports.

Appendix 3 contains a checklist of risks. You can use this list as a guideline when drawing up the risk overview for your own specific project. You can enlist the support of specialist consultants to help identify the risks or to lead your brainstorming session or risk analysis working group.

b. Categorize the risks

Once you have identified all the risks, they need to be categorized. You need to think systematically to categorize the risks. On the one hand, this categorization will help you to see whether you have forgotten any risks. On the other hand you will see which risks are related to each other and they will be easier to review.

There are many ways in which the risks can be categorized. For instance: in chronological order, based on who bears responsibility for the risk or the project phase. The checklist in Appendix C categorizes the risks per project phase.

Example 19 contains an example of a list of risks for a (fictitious) project which have been categorized.

c. Determine the global risk allocation and make a selection of the most important risks

Once you have drawn up a complete list of all risks, and you have referred to previous risk analyses, you can determine the allocation of risks for the public procurement option. For each risk you can determine who is best positioned to manage the risk and thus who will be the most cost effective manager of this risk. Generally speaking there are three categories:

- risks which a public authority wishes to keep or which the private party will not accept;
- risks which a public authority is eager to pass on to private parties;
- risks which the public authority considers passing on, but which could also be shared with the private party.

It is essential that the allocation of risks is understood to be able to compare (in the PPC and PSC) the public and PPP procurement options. Risks that remain with the public sector in both cases are not relevant in the comparison.

Example 20 shows an example of the risk allocation results.

d. Estimate the size, impact and probability of the risks

In order to draw up the risk matrix you need to have an idea of:

- the size and timing of the risks;
- the probability that the risk will occur.

If you have access to risk data from similar projects or if the risks can be insured on the open market, then it is relatively simple to value the risks. However, in most cases it is not that simple. One pitfall is that you identify a risk as being unquantifiable too early in the process. The advice and experience of experts is useful here.

Estimating the value and probability of risks is not an exact science. It is therefore advisable to document which assumptions you have made and which references you have used at each stage. This also applies to the degree in which the experts agree with each other about the estimates. Substantial differences between the estimates made by experts can lead to even more uncertainty.

A full analysis of the probability distribution for the occurrence of risks is expensive. You may decide to make a selection of the most important risks and to analyse these in more detail. For example, concentrate only on the risks with the greatest probability or those risks which will have the biggest impact. Alternatively you may decide to make a selection of the risks which have an impact of a certain percentage on the total cash flow of the project (for example 1% or more). In this way the project team can concentrate on the most relevant risks.

Example 21 shows a summary of the results where the size and probability of the risks have been estimated. It's important that there should always be an explanation to accompany such a spreadsheet.

e. Assess the interrelationships (and correlation) of the risks you have defined

Some risks are independent. But a risk can also be related to another risk. This means that the probability of the one risk occurring provides information about the probability of the related risk occurring.

A possible pitfall when drawing up the risk analysis is to ignore the existence of a relationship between risks. The possible relationship between risks can influence the final calculation of the risk value. Ignoring this relationship can lead to unrealistic scenarios. For example, the chance that there is a scarcity of suitable personnel is not unrelated to the chance of higher personnel costs.

Determining which risks are related is one of the most difficult parts of the risk analysis. To what degree are the risks identified related? To measure this, the term correlation is often used. A complication is that only a few risks:

- have perfect positive correlation (the risks always occur, or do not occur together; a one-to-one situation);
- have perfect negative correlation (the risks are exclusive, an either-or situation);
- are completely independent (the risks have absolutely no influence on each other).

The reality is that there is usually some degree of correlation between the risks, but that the degree to which the risks are related is difficult to determine.

Example 22 shows a general assessment of the correlation between risks; at this stage no consequences have been linked to the risks.

f. Draw up a risk matrix

You can summarize all the available information in a risk matrix. A risk matrix is in fact no more that a summary of the risks identified.

Example 23 shows an example of a risk matrix

g. Determine the probability distribution

Depending on size of the project, the expertise available in the project team and in the risk analysis working group you can attempt to estimate the probability distribution for the most important risks. This improves and substantiates the assessment of the risks. You can get your experts to make an estimate of the maximum impact, the minimum impact as well as the most probable outcome. You can also ask your experts whether they consider each value between the minimum and the maximum to be equally probable (uniform distribution), or whether the value increases or decreases towards the maximum or minimum (a triangular distribution), or that the values can best be considered as separate scenarios, each with their own chance of occurring. This also helps you to understand the degree of risk distribution, also for the technical risk.

Estimating the risk value and distribution of probability for risks is not an exact science. The exercise explained here is therefore no more than a refinement of the assessment of the risks based on the current understanding. It is, and always will be, a forecast.

It may be that even the experts have quite different opinions about the valuation of the risks or the probability that a particular risk will occur. In such cases, the most pragmatic approach you can take is to calculate the average value and then clearly explain how the opinions of the experts differ. Where there are doubts about the valuation of risks which have a considerable impact or high degree of probability it can be advisable to research the risk further by consulting other experts.

In Example 24 the risk matrix has been supplemented with an assessment of the probability distribution.

h. Study any possible correlations

Now that you have identified the relationships between some risks (in Step 5) you will want to be certain of the correlation of the most important risks with other risks. You can do this using the risk matrix. By combining all identified risks per risk category and then, by dismissing all unrealistic combinations, you can make a global estimate of correlation. In this way you can incorporate the correlation between risks in the analysis.

Even more complicated is incorporating the degree of correlation. Using the opinions of your experts you can estimate the actual degree of correlation. These estimates can be subsequently quantified using specialized statistical techniques.

i. Calculate the value of the risks

There are several methods available to calculate the value of all risks. The two most important methods are:

- the deterministic method;
- the scenario analysis.

The deterministic method sums all the average values of the risks, and adds an uncertainty margin. This calculation can be carried out relatively quickly and gives you a rough estimate of the value of all the risks.

This scenario analysis concentrates on the total value of the most important risks and incorporates the underlying correlation. This calculation can also be carried out relatively quickly and in this case it gives you a general estimate of the value of the risks in several scenarios.

Examples 25 and 26 show the risk valuation calculated using both methods.

j. Present the results

For the presentation of the results you can consider using graphics with a clear textual explanation. It is not sufficient to just state the mathematical or statistical formula and its results; you must explain this in "real language".

Example risk analysis

The outcome of the risk analysis has resulted in a value of € 16.3 million with normal distribution, a certainty of 95% and a standard deviation of 2.5%. The equivalent in "real language" is: the average value of the risks is € 16.3 million with a 95% probability that the actual value of the risk is between € 15.39 million and € 17.01 million.

5. The valuation of spread risks

As we mentioned earlier, this manual differentiates between technical spread risks and market-related spread risks.

5.1 Technical spread risks

You can determine and value the technical spread risks separately, using a risk matrix. However, since this manual first explains how pure risks are valued, we can refer to Paragraph 4 of this appendix where the use of the risk matrix is described.

To determine an individual technical spread risk you first calculate the expected size of the risk and the probability that it will occur for several scenarios. You can enlist help from experts and consult statistics and relevant research available.

Example technical spread risks

Taske discusses two technical spread risks with the project team; the unpredictable weather and the fluctuations in the price of oil. The team values these risks by calculating the expected size of the risk and the probability that it will occur for several scenarios. They use statistics provided by the Central Statistics Office.

Estimates are made for various scenarios. The underlying assumptions are verified in two discussions with experts. The cost estimate in the rough PSC is based on an average of 10 days where temperature is below 0 °C per winter and the oil price is taken at $ 18 per barrel. In the analysis of the two technical distributed risks below the value of the spread of these estimates is calculated.

meteorological circumstances	effect	probability	value
1. mild winter: 5 days below 0°C	-3,000,000	10%	-300,000
2. average winter: 5 days below 0°C	0	20%	0
3. winter period: 15 days below 0°C	3,000,000	45%	1,350,000
4. winter period: 20 days below 0°C	6,000,000	20%	1,500,000
5. maximum: 25 days below 0°C	9,000,000	5%	450,000
valuation of risk of disadvantageous weather:			3,000,000

price of oil	effect	probability	value
1. under average price $18	-3,000,000	20%	-600,000
2. average price $18	0	45%	0
3. slightly higher than average price	3,000,000	20%	600,000
4. considerably high price	6,000,000	10%	600,000
5. extremely high price	9,000,000	5%	450,000
valuation of risk of fluctuations in the price of oil:			1,050,000

Taske subsequently creates the cash flow chart including the valuation of these spread risks. A second method to determine the technical spread risks is to calculate the 84% value for all the risks. This means that a value is assigned to the probability that a budgeted amount turns out to be higher than expected (50% estimate).

Example 84% value

Together with her risk analysts Taske studies the risk concerning unfavourable ground and soil conditions. According to the risk matrix the experts have estimated that the damage is at least € 2.5 million and will be no more than € 7.5 million. The most probable value of the damage, according to the normal distribution, is € 5 million. This is the 50% value. Taske then mentions that, for the PSC, she would rather see that 84% of the risk valuations are not under estimated. The risk analysts perform a statistical analysis based on the standard normal distribution. They determine the standard deviation and calculate that the value of this risk is about € 1 million higher. The 84% value is thus € 6 million instead of € 5 million. The value of the spread is therefore € 1 million (€ 6 less € 5 million).

5.2 Market-related spread risks

It is preferable to determine the market-related spread risks using a combination of the benchmark method and the cost of capital method. A partial overlap between the market related spread risks and the valuation of the technical spread and pure risks is unavoidable. You can keep the probability of overlap to a minimum by carefully choosing the correct assignment of risks.

5.3 Benchmark method

If good benchmark data is available then this is a good method to determine risk factors in the same way as the capital market would do for similar projects. Generally speaking this is an increase to cover all project risks which are not otherwise covered which the providers of funds more or less assume for themselves.

The benchmark method refers to similar projects and uses the results of the risk valuation from these projects as input for the risk analysis in the current project. The problem is that each project has its own unique characteristics and that generally speaking it is not easy to find a similar project. A disadvantage of this method can also be that too little attention is paid to the process of understanding and valuing the risks. Experience also shows that it has often been necessary to correct the risk factor for the project-specific allocation of risks within the benchmark.

Cost of Capital

The risk factor determined using the benchmark can be verified by calculating the costs and assets of an SPV by referring to the average required yield during the life cycle of the project. The Weighted Average Cost of Capital is usually used here. You can use this method to calculate the size of the risk factor which the capital market would charge and in this way the calculated value can be verified against the benchmark. The important factor here is the risk which the financiers bear and the percentage that they charge for this.

From experience in other countries we know that the risk surcharge demanded is mostly higher in the initial investment phase of the project than in the latter management and maintenance phase. Most projects are therefore refinanced after a few years with lower interest rates. Also the ratio of internal to external capital as well as the risk profile will change during the life cycle of the project. The required return on internal and external capital is therefore not constant but should be calculated as a weighted average over the complete life cycle of the project.

The required return on investment depends on the risk of the market in which the project is carried out. The remuneration required from the financiers reflects the level of risk which they see in the cash flow on which they depend for their repayment. The credit providers (bankers, bond holders, etc.) ask a higher rate than the inter-bank interest rate (the rate at which they can borrow money themselves). The shareholders want a return on the capital which they have invested. A standard method to calculate the level of this risk is to determine the Weighted Average Cost of Capital (WACC) for the organisation, less the risk-free interest rate (the interest on government bonds with the same period to maturity).

Example The benchmark

In the example shown in the PSC manual, the assumption was made that a similar project in England (design, construction and exploitation of a road with a tunnel for 12 years) had a risk premium of 1.85% above the nominal risk-free interest rate. Taske's project team has subsequently made a careful study of the risk allocation for both projects and made comparisons. They have also taken into consideration the shorter development period for the A101/A18 project. This ultimately led to a correction of the risk premium by -0.35%, or in other words, a risk premium of 1.5% was calculated. Taske asked two specialized consultants, who were selected in consultation with the PPP Knowledge Centre to calculate the expected cost of capital for the private parties. This calculation resulted in an almost identical risk premium.
Using this analysis Taske decides that the market related spread risk should be valued with a risk premium of 1.5%. This percentage does not influence the cash flow, but it does affect the interest rate applied to the project. This is increased to 7.5%.

6. Conclusion

The description of risk analysis given in this appendix is intended to be a general explanation. If required, the PPP Knowledge Centre can help you to find expert support and examples of risk analyses which have already been carried out.

The table below shows the most commonly used methods for the valuation of risks:

Risk valuation

pure risks	valuation based on risk matrix	include in cash flows
+		
technical distributed risks	either: value using risk matrix	include in cash flows
	or: value by calculating the x% value	include in cash flows
market-related spread risks	either: benchmark method	incorporate in interest rates (risk factor)
	or: cost of capital method	incorporate in interest rates (risk factor)

Appendix

C

Appendix C: risk checklist

Project phase	Risk category	Risk description
Design	Design	- Unclear design specifications - Potential for design modifications - Integration problems between the design and the optimisation of the operating phase - Integration problems between the design and current legislation and time restrictions (for example regarding health and safety)
Construction	Construction/ Building	- Inexperienced firm of civil engineers / poor performance in the past - Exceeding construction costs - Consequences of design modifications for the construction costs - Unrealistic project planning and timing - Complications in the construction programme or construction plan - Unfavourable ground and soil conditions or unfavourable location - Accessibility of the location and security of the construction site - Liability to third parties - Actions taken by protest groups (physical or legal) which may result in delay of the construction - Default on the part of subcontractors - Changes in legislation which have consequences for the design or the construction - Project management including procedure for temporary housing - Testing the handover procedures - Risk of supplies from third parties - Force majeure and delays, temparary works, additional work and reparations

Project phase	Risk category	Risk description
	Sponsors	- General and specific experience of sponsors - Financial strength of sponsors - Willingness of sponsors and the strategic relevance of the project - Market position of the sponsors
	Technology	- Inability to meet the output specifications - No commercially proven success on a similar scale - Availability of alternative suppliers - Technological ageing
Completion	Purchaser	- Financial strenght of purchaser - Legal status of contract partners / change within the procuring authority - Change in statutory responsibilities of the public authority - Lack of experience on the part of the commissioning authority for this type of project
	Market risk or spread risk	- Market demand / volume - Fluctuations in market prices - Existence and nature of competition - Impact of regulation and legislation - Macro-economic influences
Management & maintenance	Operational risks	- Unrealistic performance criteria - Cost of operational contracts and contracts with service suppliers - Availability of alternative operators and suppliers of services - Specific changes to regulations and legislation - Expertise of the people carrying out operational services including planning budgeting and staffing - Poor operational procedures and performance monitoring
	Supply risk	- Risk of delay due to poor supply - Availability of alternative suppliers - Increase in purchasing costs
	Maintenance	- Importance of assets renewal during the exploitation risk or concession period - Adequacy of the repayment obligations in relation to of maintenance costs - Significant renovation costs - Fluctuations in the timing of the costs during the product life cycle - Conditions at hand over - Level of character of the life cycle costs (increasing or decreasing)
	Technology	- Technological obsolesence - Change of operators - Ability to meet changing requirements and conditions
Other risks or general risks	Rules and legislation	- Changes in taxation and fiscal conditions - Changes in legal requirements (discriminatory and non-discriminatory) - Changes in health and safety regulations - Changes in environmental law - Changes in employment law and regulations
	Political risks	- Political changes in policy affecting assumptions and conditions
	Territorial risks	- Transfer risks (across national borders) - Political stability
	Financial risks	- Residual value risk - Duration of the agreement / average life cycle - Required reserves - Inflation risks - Refinancing risks
	Financial structure	- Vulnerability to currency fluctuations - Capital structure - Control of project costs - Quality of collateral (including legal enforcement)
	Force majeure	- Force majeure - Disasters - Other unforeseen circumstances

Appendix

D

Appendix D: glossary

Term	Description
Added value	Added value, also 'value for money' means higher quality for the same money or the same quality for less money.
Ancillary revenues	Additional income generated by the project which was not part of the original specification.
Awarding	The project is awarded to the company whose bid scores best against the predefined award criteria. (See also specifications).
Call for tenders	Public procedure, which can be audited, whereby companies are given the opportunity to submit a tender for the product or service to be provided.
Cash flow	Costs, income and risks which together determine the profitability of the project.
CBA	Cost benefit analysis.
Change protocol	Agreement made in advance in which the parties indicate under which circumstances the PSC can be modified and who is authorized to suggest and make changes.
Combination Projects	Projects whereby various forms of cooperation are combined, for example a concession and a joint venture.
Concession	The exclusive right granted to a commercial organisation to exploit a specific project for a defined period of time.
Construction team	Innovative tender process for DB contracts, whereby public and private parties take joint responsibility for the design and construction.
Cooperation form	Also referred to as a cooperation model: for example innovative tendering (DB), DBF, DBFM, concession, joint venture etc.
DB	Design and Build: design and construction are put out to tender as one project.
DBF	Design, Build and Finance: design, construction and financing are placed in the hands of a private party or a consortium of private parties.

DBFM	Design, Build, Finance and Maintain: design, construction, financing and maintenance are placed in the hands of a private party or a consortium of private parties.
DBFMO	Design, Build, Finance, Maintain and Operate: design, construction, financing, maintenance and operation are placed in the hands of a private party or a consortium of private parties.
Discount rate	The percentage applied to the cash flow to calculate present its value.
Discounting	A method for comparing cash flows by adjusting them for expected inflation and time preferences (and associated risks).
Hidden costs	Hidden costs are costs which are incurred, but which cannot be allocated directly to the project because they are part of the fixed costs or overhead.
Input specifications	Criteria set for the technical realisation of the project.
MIT	Long-term infrastructure and transport plan.
Net present value (NPV)	Costs and revenues of the project are expressed over time and are calculated back to their net present value (NPV). This calculation is called discounting. By discounting all the costs and income for the project the Net Present Value can be calculated.
OEEI	Research programme into the economic effects of infrastructure.
Output specification	Criteria which defined for the functionality to be provided by the project.
PPP	Public Private Partnership, or a form of cooperation whereby public authorities and private parties share responsibilities and risks.
PPP procurement option	The procurement option whereby several elements of a project are integrated into one project, usually based on output specifications to allow for private sector knowledge and innovation.
Public procurement option	Procurement of a part of a project by means of a detailed project definition with input specifications. The financial risks remain almost entirely with the government.
Requirements	A set of requirements defined by the commissioning authority: often very similar to the input specification.
Scope	Extending or reducing the definition of the project; for example; whether or not to include parts the infrastructure.
Specification	Document containing information about the required input; companies draw up their tenders based on this document.
Transaction costs	The costs associated with the development of the initial option studies, tender documents and contract models.

Example Net Present Value (NPV)

A consortium invests an extra € 10 million in an infrastructure projects over a period of three years. Given that the discount rate for this loan is 12 percent, then the current economic value (NPV) of this future investment is: $10{,}000{,}000/(1.12)^3 = 7{,}117{,}800$. The net present value is sometimes referred to as the present value; these are one and the same.

Appendix

E

Appendix E: differences between the old and new PPP manuals

The most important differences with the Public Private Comparator manual dated October 1999 are:

- extra requirements to the preparation of the PPC due to the addition of an Inception report;
- the PPC has been divided into Qualitative analysis and Quantitative analysis;
- if required, the Qualitative analysis can be carried out separately at an earlier stage in the project. For example in order to gain a better understanding of the alternatives or because there is little quantitative information available;
- the Qualitative analysis can also be carried out directly in combination with the Quantitative analysis;
- the PPC is a financial comparison between project procurement alternatives. The economic PPC is not within the scope of this manual;
- the focus on differences between the procurement alternatives which affect the costs and income. In the past, the focus was on arguments for the added value of a public-private partnership;
- this manual guides potential users of the PPC step by step through the content and organisation surrounding the PPC. The combination of both aspects is required to draw up an effective PPC;
- the manual contains examples taken from a case with actual figures so that the reader can see directly how to apply the method in practice;
- the manual describes each step to be taken and provides a clear description of the output required per module.

Appendix B concentrates on the risk analysis and the differences between the public and PPP procurement options.

Appendix

F

Appendix F: worked examples

Example 1 Differences between the public and PPP procurement options

phase	differences
preparation costs	- further consideration of the output specification (the preparation) is complex and time consuming - -> overrun probability; - tendering based on the output specifications increases the chance of the innovative ideas; - the hidden costs for the public sector are much higher than in a DBFO situation; - a private party has less influence on planning problems than the public authority; - the condition of the ground and soil or findings in the ground can delay the project and increase the costs.
transaction costs	- the transaction costs are higher in a DBFO situation and the transaction time in longer; - the hidden costs for the public sector are lower in a DBFO situation.
realisation costs	- private parties can acquire ground more quickly; - when private parties have integral responsibility for the design, the risk that it is incomplete is lower; - the hidden costs for the public sector are much lower than in a DBFO situation; - private parties save costs by integrating the design and development; - by integrating the design and development of the tunnel savings are possible (ingenious solutions); - by integrating the design and development of road the construction time is reduced; - the transfer of the risk of overrun on costs to the private parties prevents disappointing results during construction or development; - the transfer of risks during the realisation phase reduces the chance of delays during construction; - the private party presents itself in a better light by charging a fee based on the availability; - the remuneration mechanism ensures that the private party will minimise any budget overrun; - good management of water resources during construction by the private party saves costs and speeds up work; - an integral bid process can result in fewer potential bidders and thus a less competitive price.
development costs	- by anticipating maintenance work during the construction phase, management and maintenance will be cheaper; - the transfer of the risk of budget overrun to private parties eliminates extra costs during the exploitation phase.
income	- private parties can create added value by creating an alternative application for the assets; - private parties increase value of assets by generating extra income.

Example 2 Assessment of differences (effect on costs, income or risks)

phase	differences	public	PPP	effect on costs, income and risks
preparation costs	- full consideration of the output specification (the preparation) is complex and time consuming -> chance of overrun	o	-	risk of overrun on preparation time
	- call for tender based on output specification increases the chance that innovative ideas will be incorporated	o	+	preparation, realisation & exploitation
	- the hidden costs for the public sector are lower than in a DBFO situation	o	-	preparation, realisation & exploitation
	- a private party has less influence on planning problems than the public authority	o	-	risk of planning problems
	- the condition of the ground and soil or findings in the ground can delay the project and increase the costs	o	+	risk of unfavourable ground and soil conditions
transaction costs	- the transaction costs in a DBFO situation are greater, and also the transaction lead time is longer	o	-	transaction costs & transaction lead time
	- the hidden costs for the public sector are lower than in a DBFO situation	o	-	transaction costs
realisation costs	- private parties can acquire land quicker	o	+	realisation costs
	- the risk of an incomplete design is lower when the private parties carry integral responsibility	o	+	risk of extra costs due to incomplete design
	- the hidden costs for the public sector are lower than in a DBFO situation	o	+	realisation costs
	- private parties can make cost saving by integrating the design and construction	o	+	realisation costs & realisation lead time
	- savings are possible in tunnel construction when the design and construction are integrated (innovative solutions)	o	+	realisation costs & realisation lead time
	- sorter lead times can be achieved in road construction when the design and construction are integrated	o	+	realisation lead time
	- the transfer of the risk of budget overrun to private parties eliminates extra costs during the construction or exploitation phases	o	+	risk of extra costs during the realisation phase
	- the transfer of risks during the realisation phase reduces the chance of delays during construction	o	+	risk of delays during the realisation phase
realisation costs	- remuneration based on availability encourages the private party to perform better	o	+	realisation costs, realisation lead time & exploitation costs
	- the remuneration mechanism ensures that the private party will minimise any budget overrun	o	+	realisation & exploitation
	- good management of water resources during construction by the private party saves costs and speeds up work	o	+	realisation costs & realisation lead time
	- an integral bid process can result in fewer potential bidders and thus a less competitive price	o	+	risk of disappointing results of tendering process
development costs	- by anticipating maintenance work during the construction phase, management and maintenance will be cheaper	o	+	development costs
	- the transfer of the risk of budget overrun to private parties eliminates extra costs during the exploitation phase	o	+	risk of higher costs during development phase
income	- private parties can create added value by creating an alternative application for the assets	o	+	value/income
	- private parties increase value of assets by generating extra income	o	+	value/income

Explanation: o *reference development form*
\+ *financially more favourable than the reference form*
\- *financially less favourable than the reference form*

Example 3 Preparation costs / public procurement option

preparation costs	total costs	2002	2003	2004	2005	2006	2007	2008
hidden costs	2,000,000	2,000,000						
preparation	5,100,000	5,100,000						
risk of unfavourable ground	750,000	750,000						
and soil conditions								
risk of planning problems	250,000	250,000						
total	8,100,000	8,100,000						

preparation costs	2009	2010	2011	2012	2013/2032	2033
hidden costs						
preparation						
risk of unfavourable ground						
and soil conditions						
risk of planning problems						
total						

Example 4 Transaction costs / public procurement option

transaction costs	total costs	2002	2003	2004	2005	2006	2007	2008
legal support	500,000		100,000	400,000				
draw up bidding								
documents	300,000		60,000	240,000				
assess bids and negotiate	400,000		80,000	320,000				
monitor construction	500,000		100,000	100,000	100,000	100,000	100,000	
hidden costs	750,000		150,000	600,000				
total	2,450,000		490,000	1,660,000	100,000	100,000	100,000	

transaction costs	2009	2010	2011	2012	2013/2032	2033
legal support						
draw up bidding						
documents						
assess bids and negotiate						
monitor construction						
hidden costs						
total						

Example 5 Exploitation costs / public procurement option

design costs	total costs	2002	2003	2004	2005	2006	2007	2008
hidden costs	1,500,000	562,500	937,500					
design costs	10,320,000	3,870,000	6,450,000					
extra design costs	250,000		250,000					
capital expenditure	**total costs**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
acquisition of land	3,407,000	2,044,200	1,362,800					
preparation of land for construction	3,460,000			3,460,000				
build artificial construction (tunnel)	105,975,000			10,597,500	31,792,500	31,792,500	31,792,500	
road construction	86,649,000			8,664,900	25,994,700	25,994,700	25,994,700	
risk of extra costs probability of disappointing results from the bidding	7,979,640	81,768	54,512	908,896	2,311,488	2,311,488	2,311,488	
	3,989,820	42,519	28,346	472,626	1,201,974	1,201,974	1,201,974	
total	223,530,460	6,604,991	9,087,164	24,107,930	61,304,672	61,304,674	61,304,676	

design costs	2009	2010	2011	2012	2013/2032	2033
hidden costs						
design costs						
extra design costs						
capital expenditure						
acquisition of land						
preparation of land for construction						
build artificial construction (tunnel)						
road construction						
risk of extra costs						
probability of disappointing results from the bidding						
total						

Example 6 Exploitation costs / public procurement option

maintenance costs	total costs	2002	2003	2004	2005	2006	2007	2008
replace road surface	25,000,000							
periodic road maintenance	11,000,000							1,826,000
modernisation security systems	15,000,000							
operational costs	**total costs**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
management & supervision	20,944,580	618,881	851,458	2,258,889	5,744,186	5,744,186	5,744,187	
security surveillance in tunnel	5,400,000						200,000	200,000
management of road	13,500,000						500,000	500,000
hidden costs	2,000,000	59,097	81,306	215,702	548,513	548,513	548,513	
risk of extra costs	1,856,389	13,560	18,655	49,492	125,854	125,854	139,854	50,520
total	94,700,969	691,538	951,419	2,524,082	6,418,553	6,418,553	7,132,554	2,576,520

maintenance costs	2009	2010	2011	2012	2013/2032	2033
replace road surface				12,500,000		
periodic road maintenance						1,826,000
modernisation security systems						
operational costs	**2009**	**2010**	**2011**	**2012**	**2013/2032**	**2033**
management & supervision						
security surveillance in tunnel	200,000	200,000	200,000	200,000	200,000	200,000
management of road	500,000	500,000	500,000	500,000	500,000	500,000
hidden costs						
risk of extra costs	14,000	14,000	14,000	264,000	14,000	50,520
total	714,000	714,000	714,000	13,464000	714,000	2,576,520

Example 7 Possible income / public procurement option

income from sale / rental	total costs	2002	2003	2004	2005	2006	2007	2008
land	1,200,000		1,200,000					
buildings	6,682,500						247,500	247,500
income based on residual value								
residual value road	20,000,000							
residual value security systems	7,500,000							
capital appreciation								
total income	35,382,500		1,200,000				247,500	247,500

income from sale / rental	2009	2010	2011	2012	2013/2032	2033
land						
buildings	247,500	247,500	247,500	247,500	247,500	247,500
income based on residual value						
residual value road						20,000,000
residual value security						
systems						7,500,000
capital appreciation						
total income	247,500	247,500	247,500	247,500	247,500	27,747,500

Example 8 Risk valuation / public procurement option

risk valuation	probability	effect	value
extra costs incomplete design	20%	1,250,000	250,000
unfavourable ground and soil conditions	25%	3,000,000	750,000
overrun preparation lead time			0 months
planning problems	25%	1,000,000	250,000
extra costs during realisation phase			4%
delays during realisation phase			3 months
extra costs during exploitation phase			2%
disappointing results from the bidding			2%

Example 9 Quantified differences in costs, income and risks

costs, income and risks	public	PPP
preparation costs	100%	120%
risk of unfavourable ground and soil conditions	750,000	600,000
overrun preparation lead time	0 months	2 months
hidden costs	2,000,000	3,000,000
planning problems	250,000	200,000
transaction costs	100%	176%
hidden costs	750,000	
realisation costs		
- realisation costs roads	100%	95%
- realisation costs artificial constructions	100%	93%
- acquisition costs	100%	95%
risk of extra costs incomplete design	250,000	62,500
hidden costs relating to the design	1,500,000	
extra costs during the realisation phase	4%	2.50%
delays to the realisation phase	3 months	0 months
disappointing results from the bidding	2%	2%
exploitation (management & maintenance)	100%	90%
hidden costs	2,000,000	
extra costs during exploitation phase	2%	1%
capital appreciation		9,500,000

Sources:
- expert interviews with experts mr A, mrs B, mr C and mrs D;
- interviews with the RWS construction service (mr E, mr F and mrs G);
- comparative research organisation X commissioned by the audit office;
- studies from the university of Ommeland;
- studies in the united kingdom by the National Audit Office etc,;
- organisation Y, experience gained from several projects.

Example 10 Preparation costs / PPP procurement option

preparation costs	total costs	2002	2003	2004	2005	2006	2007	2008
hidden costs	3,000,000	3,000,000						
preparation	6,120,000	6,120,000						
risk of unfavourable ground	750,000	750,000						
and soil conditions								
risk of planning problems	250,000	250,000						
total	10,120,000	10,120,000						

preparation costs	2009	2010	2011	2012	2013/2032	2033
hidden costs						
preparation						
risk of unfavourable ground						
and soil conditions						
risk of planning problems						
total						

Example 11 Transaction costs / PPP procurement option

transaction costs	total costs	2002	2003	2004	2005	2006	2007	2008
legal support	880,000		660,000	220,000				
draw up bidding								
documents	528,000		396,000	132,000				
assess bids and negotiate	704,000		528,000	176,000				
monitor construction	880,000		176,000	176,000	176,000	176,000	176,000	
hidden costs								
total	2,992,000		1,760,000	704,000	176,000	176,000	176,000	

transaction costs	2009	2010	2011	2012	2013/2032	2033
legal support						
draw up bidding						
documents						
assess bids and negotiate						
monitor construction						
hidden costs						
total						

Example 12 Realisation costs / PPP procurement option

design costs	total costs	2002	2003	2004	2005	2006	2007	2008
hidden costs								
design costs	10,320,000	3,870,000	6,450,000					
extra design costs	62,500		62,500					
capital expenditure	**total costs**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
acquisition of land	3,236,650	1,941,990	1,294,660					
preparation of land for construction	3,460,000			3,460,000				
build artificial construction (tunnel)	98,556,750			9,855,675	29,567,025	29,567,025	29,567,025	
road construction	82,316,550			8,231,655	24,694,965	24,694,965	24,694,965	
risk of extra costs	4,689,249	48,550	32,367	538,683	1,356,550	1,356,550	1,356,550	
probability of disappointing results from the bidding (=2%)	3,751,399	38,840	25,893	430,947	1,085,240	1,085,240	1,085,240	
total	206,393,098	5,901,382	7,867,423	22,518,964	56,705,785	56,705,786	56,705,787	

design costs	2009	2010	2011	2012	2013/2032	2033
hidden costs						
design costs						
extra design costs						
capital expenditure	**2009**	**2010**	**2011**	**2012**	**2013/2032**	**2033**
acquisition of land						
preparation of land for construction						
build artificial construction (tunnel)						
road construction						
risk of extra costs						
probability of disappointing results from the bidding (=2%)						
total						

Example 13 Exploitation costs / PPP procurement option

maintenance costs	total costs	2002	2003	2004	2005	2006	2007	2008
replace road surface	22,500,000							
periodic road maintenance	9,900,000							1,643,400
modernisation security systems	13,500,000							
operational costs	**total costs**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
management & supervision	18,850,122	538,980	718,541	2,056,683	5,179,005	5,179,005	5,179,006	
security surveillance in tunnel (per annum)	4,860,000						180,000	180,000
management of road (per annum)	12,150,000						450,000	450,000
hidden costs								
risk of extra costs	817,216	5,390	7,185	20,567	51,790	51,790	58,090	22,734
total	82,577,338	544,370	725,726	2,077,250	5,230,795	5,230,795	5,867,096	2,296,134

maintenance costs	2009	2010	2011	2012	2013/2032	2033
replace road surface				11,250,000		
periodic road maintenance						1,643,400
modernisation security systems						
operational costs	**2009**	**2010**	**2011**	**2012**	**2013/2032**	**2033**
management & supervision						
security surveillance in tunnel (per annum)	180,000	180,000	180,000	180,000	180,000	180,000
management of road (per annum)	450,000	450,000	450,000	450,000	450,000	450,000
hidden costs						
risk of extra costs	6,300	6,300	6,300	118,800	6,300	22,734
total	636,300	636,300	636,300	11,998,800	636,300	2,296,134

Example 14 Possible income / PPP procurement option

income from sale / rental	total costs	2002	2003	2004	2005	2006	2007	2008
land	1,200,000		1,200,000					
buildings (per annum)	6,682,500						247,500	247,500
income based on residual value								
residual value road	20,000,000							
residual value security								
systems	7,500,000							
capital appreciation	9,500,000							
total income	44,882,500		1,200,000				247,500	247,000

income from sale / rental	2009	2010	2011	2012	2013/2032	2033
land						
buildings (per annum)	247,500	247,500	247,500	247,500	247,500	247,500
income based on residual value						
residual value road						20,000,000
residual value security						
systems						9,500,000
capital appreciation	380,000	380,000	380,000	380,000	380,000	380,000
total income	627,500	627,500	627,500	627,500	627,500	30,127,500

Example 15 Risk valuation / PPP procurement option

risk valuation	probability	effect	value
extra costs incomplete design	5%	1,250,000	62,500
unfavourable ground and soil conditions	20%	3,000,000	600,000
overrun preparation lead time			2 months
planning problems	20%	1,000,000	200,000
extra costs during realisation phase			3%
delays during realisation phase			0 months
extra costs during exploitation phase			1%
disappointing results from the bidding			2%

Example 16 Cash flow chart & net present value (end 2002) / public procurement option

capital expenditure/costs	total costs	2002	2003	2004	2005	2006	2007	2008
preparation costs	8,100,000	8,100,000						
transaction costs	2,450,000		490,000	1,660,000	100,000	100,000	100,000	
realisation costs	223,530,460	6,604,991	9,087,164	24,107,930	61,304,672	61,304,674	61,304,676	
exploitation costs	94,700,969	691,538	951,419	2,524,082	6,418,553	6,418,553	7,132,554	2,576,520
income	35,382,500		1,200,000				247,500	247,500
cash flow	293,398,929	15,394,527	9,326,581	28,290,008	67,821,220	67,821,221	68,287,722	2,327,012
inflation (2%)	1.02	1.00	1.02	1.04	1.06	1.08	1.10	1.13
nominal cash flow	316,066,363	15,394,527	9,513,112	29,432,924	71,972,421	73,411,871	75,395,163	2,620,593
nominal discount rate (6%)	1.06	1	1.06	1.12	1.19	1.26	1.34	1.42
present value cash flow		15,394,527	8,974,634	26,195,198	60,429,433	58,149,078	56,339,652	1,847,415
net present value (per 31-12-2002)	250,634,229							

capital expenditure/costs	2009	2010	2011	2012	2013/2032	2033
preparation costs						
transaction costs						
realisation costs						
exploitation costs	714,000	714,000	714,000	13,464,000	714,000	2,576,520
income	247,500	247,500	247,500	247,500	247,500	27,747,500
cash flow	464,491	464,490	464,489	13,214,488	464,486	25,173,013
inflation (2%)	1.15	1.17	1.20	1.22	1.81	1.85
nominal cash flow	533,554	544,224	555,107	16,108,387	841,319	46,509,377
nominal discount rate (6%)	1.50	1.59	1.69	1.79	5.74	6.09
present value cash flow	354,844	341,453	328,567	8,994,839	146,482	7,639,390
net present value (per 31-12-2002)	250,634,229					

Example 17 Cash flow chart & net present value (end 2002) / PPP procurement option

capital expenditure/costs	total costs	2002	2003	2004	2005	2006	2007	2008
preparation costs	10,120,000	10,120,000						
transaction costs	2,992,000		1,760,000	704,000	176,000	176,000	176,000	
realisation costs	206,393,098	5,901,382	7,867,423	22,518,964	56,705,785	56,705,786	56,705,787	
exploitation costs	82,577,338	544,370	725,726	2,077,250	5,230,795	5,230,795	5,867,096	2,296,134
income	44,882,500		1,200,000				247,500	247,500
cash flow	257,199,936	16,565,751	9,153,149	25,300,214	62,112,580	62,112,581	62,501,382	2,048,634
inflation (2%)	1.02	1.00	1.02	1.04	1.06	1.08	1.10	1.13
nominal cash flow	266,709,734	16,565,751	9,336,212	26,322,343	65,914,367	67,232,655	69,006,576	2,307,095
nominal discount rate (6%)	1.06	1	1.06	1.12	1.19	1.26	1.34	1.42
present value cash flow		16,565,751	8,807,747	23,426,791	55,342,973	53,254,560	51,565,728	1,626,411
net present value (per 31-12-2002)	224,776,510							

capital expenditure/costs	2009	2010	2011	2012	2013/2032	2033
preparation costs						
transaction costs						
realisation costs						
exploitation costs	636,300	636,300	636,300	11,998,800	636,300	2,296,134
income	627,500	627,500	627,500	627,500	627,500	30,127,500
cash flow	8,800	8,800	8,800	11,371,300	8,800	27,831,366
inflation (2%)	1.15	1.17	1.20	1.22	1.81	1.85
nominal cash flow	10,108	10,311	10,517	13,861,551	15,940	51,420,921
nominal discount rate (6%)	1.50	1.59	1.69	1.79	5.74	6.09
present value cash flow	6,723	6,469	6,225	7,740,218	2,775	8,446,135
net present value (per 31-12-2002)	224,776,510					

Example 18 Summary results PPC

capital expenditure/costs	public procurement option	PPP procurement option
preparation costs	8,100,000	10,120,000
transaction costs	2,450,000	2,992,000
realisation costs	223,530,460	206,577,338
exploitation costs	94,700,969	82,577,338
income	35,382,500	35,382,500
capital appreciation		9,500,000
nominal cash flow	316,066,363	266,709,734
nominal discount rate (6%)	1.06	1.06
net present value (per 31-12-2002)	250,634,229	224,776,510

Example 19 List of risks (pure risks) & categorisation

Risk	Risk Description	Example	Risk category
- Risk of unfavourable results of bidding process	- Risk of unfavourable results bidding process	- Few bidders therefore high prices	- Transaction risk
- Design risk	- Probability of gaps in the design	- Inadequate lighting	- Realisation risk
- Risk of unfavourable ground and soil conditions	- Probability of unfavourable ground and soil conditions	- Archaeological finding	
- Risk of extra costs during realisation phase	- Probability of large accident	- Damage to works	
- Risk of extra costs during realisation phase	- Probability of flooding	- Inundations of works	
- Risk of extra costs during realisation phase	- Probability of protest demonstrations	- Environmental protests that interrupt the works	
- Technical risk	- Probability of problems with piling	- Ground conditions differ from trial results	
- Risk of extra costs during exploitation phase	- Probability of supplementary security requirements	- Law requiring additional safety measures.	- Exploitation risk
- Risk of extra costs during exploitation phase	- Replacement investment sooner than planned	- Faster deterioration of asphalt road surface	

Example 20 Allocation of risks

risk and number	allocation of risk
1. risk of unfavourable results bidding process	keep
2. unfavourable ground and soil conditions	transfer or share
3. design risk	transfer
4. risk of extra costs during realisation phase	transfer
5. technical risk tunnel piling techniques	transfer
6. risk of extra costs during exploitation phase	transfer

Example 21 Estimate of size and probability

risk and number	size	probability	effect	risk category
1. risk of unfavourable results bidding process	13,000,000	33.00%	4,329,000	transaction
2. unfavourable ground and soil conditions	5,000,000	5.00%	250,000	realisation
3. design risk	500,000	2.50%	12,500	realisation
4. risk of extra costs during realisation phase	55,500,000	15.00%	8,325,000	realisation
5. technical risk tunnel piling techniques	2,500,000	25.00%	625,000	realisation
6. risk of extra costs during exploitation phase	8,300,000	25.00%	1,980,000	exploitation
total valuation of the risks			16,271,500	

Example 22 Determine relationship between risks

risk and number	relationship to other risks
1. risk of unfavourable results bidding process	none
2. unfavourable ground and soil conditions	none
3. design risk	none
4. risk of extra costs during realisation phase	with R5
5. technical risk tunnel piling techniques	with R4
6. risk of extra costs during exploitation phase	none

Example 23 Risk matrix (pure risks)

risk and number	size	probability	effect	risk category	allocation	relationship
1. risk of unfavourable results bidding process	13,000,000	33.00%	4,329,000	transaction	keep	none
2. unfavourable ground and soil conditions	5,000,000	5.00%	250,000	realisation	share	none
3. design risk	500,000	2.50%	12,500	realisation	transfer	none
4. risk of extra costs during realisation phase	55,500,000	15.00%	8,325,000	realisation	transfer	with R5
5. technical risk tunnel piling techniques	2,500,000	25.00%	625,000	realisation	transfer	with R4
6. risk of extra costs during exploitation phase	8,300,000	25.00%	1,980,000	exploitation	transfer	none
total valuation of the risks			16,271,500			

Example 24 Extended risk matrix

risk and number	size	probability	effect	risk category	allocation	relationship
1. risk of unfavourable results bidding process	13,000,000	33.00%	4,329,000	transaction	keep	none
2. unfavourable ground and soil conditions	5,000,000	5.00%	250,000	realisation	share	none
3. design risk	500,000	2.50%	12,500	realisation	transfer	none
4. risk of extra costs during realisation phase	55,500,000	15.00%	8,325,000	realisation	transfer	with R5
5. technical risk tunnel piling techniques	2,500,000	25.00%	625,000	realisation	transfer	with R4
6. risk of extra costs during exploitation phase	8,300,000	25.00%	1,980,000	exploitation	transfer	none
total valuation of the risks				16,271,500		

risk and number	probable impact	highest impact	lowest impact	type of distribution
1. risk of unfavourable results bidding process	13,000,000	19,000,000	9,000,000	distorted
2. unfavourable ground and soil conditions	5,000,000	20000000	2000000	distorted
3, design risk	500,000	750,000	250,000	uniform
4. risk of extra costs during realisation phase	55,500,000	80,000,000	37,500,000	distorted
5. technical risk tunnel piling techniques	2,500,000	4,500,000	500,000	uniform
6. risk of extra costs during exploitation phase	8,300,000	15,000,000	5,000,000	distorted
total valuation of the risks				

Example 25 Deterministic valuation of risks

risk and number	size	probability	effect
1. risk of unfavourable results bidding process	13,000,000	33.00%	4,329,000
2. unfavourable ground and soil conditions	5,000,000	5.00%	250,000
3. design risk	500,000	2.50%	12,500
4. risk of extra costs during realisation phase	55,500,000	15.00%	8,325,000
5. technical risk tunnel piling techniques	2,500,000	25.00%	625,000
6. risk of extra costs during exploitation phase	8,300,000	25.00%	1,980,000
total valuation of the risks			16,271,500

The value of the risks is estimated at € 16,3 million an uncertainty percentage of x% will be applied throughout.

Example 26 Risk valuation based on scenario analysis

risk and number	size	probability	optimistic estimate probability	effect	pessimistic estimate probability	effect
1. risk of unfavourable results bidding process	13,000,000	33.00%	16.65%	6,500,000	67.00%	26,000,000
2. unfavourable ground and soil conditions	5,000,000	5.00%	2.50%	2,500,000	10.00%	10,000,000
3. design risk	500,000	2.50%	1.25%	250,000	5.00%	1,000,000
4. risk of extra costs during realisation phase	55,500,000	15.00%	7.50%	27,750,000	30.00%	111,000,000
5. technical risk tunnel piling techniques	2,500,000	25.00%	12.50%	1,250,000	50.00%	5,000,000
6. risk of extra costs during exploitation phase	8,300,000	25.00%	12.50%	4,150,000	50.00%	16,600,000
total valuation of the risks						

The value of the risks varies between € 8.1 million and € 32.5 million, with the most probable value being € 16.3 million.

Further information

If you would like more information after reading this manual, contact:

Ministry of Finance
PPP Knowledge Centre
P.O. Box 20201
2500 EE The Hague
The Netherlands
www.minfin.nl/pps

T: +31 - (0)70 - 342 7542 (corporate and public information, Ministry of Finance).

Publishing information

Published by
PPP Knowledge Centre

Design
Via creative communications

Printed by
Van As drukwerk, design & database publishing

August 2002