Chapter 1
Preparation stage

Chapter outline

1.1  Project statement
1.2  Appointment of a project manager and integration of project management in the process management of the owner’s company
1.3  Needs and profitability analysis
1.4  Preparation of the financial scheme and loan contracts
1.5  Preparation for land purchase and corresponding contracts
1.6  Feasibility studies and corresponding investigations
1.7  Detailed area planning
1.8  Scheme design
1.1 Project statement

For an owner the project begins by the formulation of goals at the conceptual stage and progresses by the appointment of the project manager. The goal might be to construct a building that the owner will use himself, or a building he will sell, or a building from which he will take revenue from rent. The goal should be set in such a way that measurement of the extent of success can be made. The most important parameters in the process of assessment are: cost, quality and time.

Goal

The goal of the project statement is to determine the scope of the project and its participants, to quantify the goals and the assessment criteria, and to prioritise these goals. Usually the main goal is to minimise the cost. The other goals – quality and time – can be taken into account as constraints, although it is possible to ‘weight’ each of the three criteria and then assess the weighted rating. In doing this, it might create an opportunity for possible corruption. For example, an unscrupulous administrator could set up the formula for weighted criteria so that his favourite contractor can take advantage.

Activities

- The initial quantitative determination of the goal using the building’s units of power or its volume, or its available area. It is likely that there is a need to specify the goal more than once during the project’s development, considering the financial, time and quality demands and constraints.

- Prioritise the goal’s attainment criteria for both cost and time. Clarifying the relationship between the goal and the financial constraints is also a responsibility of the relevant
consultants, advisers and professional project managers during project development. The early identification of priorities in this regard enables the most suitable procurement scheme to be chosen. To select the procurement scheme, consideration of the following alternatives is necessary in order to make the correct choices for the project:

1) **Time** goals:

- possible short duration for the project as a whole;
- possible short construction duration;
- possible early start of construction works;
- exceeding the contract’s deadline is extremely undesired;
- completion earlier than the expected deadline is not recommended;
- necessary step-by-step implementation of the project, including identifying the installation time of necessary equipment.

2) **Cost** goals:

- minimum cost for the whole project (land purchase, arrangement of procurement, design, construction);
- the best economic balance between the cost of construction and the cost of the building’s usage period;
- minimum capital costs;
• minimum usage costs;

• minimum construction costs;

• exceeding the agreed construction price is extremely undesired;

• achievement of possible early certainty of price;

• minimum implementation of owner’s equity;

• division of risks using contractors as investors.

3) Is the probability of change to the project’s initial technical and technological data high or low?

4) Does the owner want to participate actively in all stages of the building-procurement process?

5) Division of risk between owner and contractor. It is important to bear this in mind when choosing the procurement scheme.

6) Is competitive bidding recommended or necessary?

☐ Choose the general procurement scheme (traditional contract, design and build contract, professional-management contract) and pricing mechanism, which can be accomplished with the help of the contract’s principal adviser.

The outcome

The outcome is a protocol containing fixed objectives for the quantity parameters of constructing the building (m² for dwellings, number of bed units for hospitals or km of gas pipeline,
etc.), limitations and priorities for cost, quality and time based on choices from the alternatives listed above. A decision as to whether the principal adviser is indispensable or not follows in the next stages of the project.

1.2 Appointment of a project manager and integration of project management in the process management of the owner’s company

Goal

The goal here is to appoint a project manager (and his team) because the next steps of the project need special construction-management competence. A decision must be made as to the method of collaboration between the project manager and the owner’s management team.

Activities

- Appointing an in-house project manager who must be available throughout the project duration and who is the single contact for the organisation. Authority to deal with project issues inside and outside the organisation is delegated to this person.

- Depending on the size and the complexity of the project, there might also be a need for a project-management team and special committee with different areas of expertise. The project manager is responsible to the committee.

- If it is impossible to find a project manager in-house who has sufficient time and ability, the contract’s principal adviser should be found externally, and the working relationship will be based on a mandatory contract.
The primary tasks of the principal contract adviser are to contribute by identifying the owner’s needs using profitability studies and by preparing the arrangement for procurement. It might prove practical to include the principal contract adviser in project management until the end of the project.

Positioning the project manager/principal contract adviser in the client company’s management structure. This is done with the view that the company’s functional divisions should serve project-management structures in the preparation of initial data and in the integration of the adopted solutions.

Determining the time limits for the integration procedures.

Carrying out the juridical procedures required to give authorisation to the project’s manager/principal contract adviser.

Motivating the project manager to guarantee the owner’s priorities and goals.

The outcome

Project-management functions are identified, as are project-management hierarchy in the company and the relationship with the client; the time schedule and the cost plan of the preparation-stage activities are prepared.

1.3 Needs and profitability analysis

Preceding procedures

These analyses are dependent on the company’s strategic development plan and the project’s preliminary business plan.
The version of the company’s strategic development plan and business plan that brings the solution of problems via real-estate purchase, sale or rent is not the subject of this handbook. In what follows, the owner’s activities are described sequentially, specifying goals for the solution of real-estate development problems by erecting new buildings or reconstructing existing ones.

**Goal**

The goal is to find the best solution (profitability or social benefit) for the proposed building-investment project taking into account the cost of construction and cost of usage of the building. The acceptable level for the project-development costs and the proportional split between building cost and the cost of land purchase would be determined. This entails the determination of the *ceiling price* for the building. The first version of the *scheme design* should be produced together with the needs analysis. Drafting the scheme design enables money to be saved while the preliminary design is produced, especially when the same design (consultancy) company is used for both stages of the design and cost calculation. The needs analysis, together with the drawing-up of a corresponding alternative scheme design and profitability calculations, is not a stage during which to make financial savings, considering that the costs of this stage are very small compared to the costs of subsequent stages, although their effect on project efficiency is most significant.

**Executor**

The executor of the needs analysis is the owner himself, using advisory services provided by the design (consultancy) company. Calculations of project profitability should be carried out by a person or company with competence in the field of a building’s life-cycle economy. It will be necessary to consult with construction-estimating companies, bank-loan
departments, real-estate companies. Professional construction-management companies, as well as design companies, can offer complete analyses. The exact division of work between the owner and the consultancy company depends on the project type and will be agreed contractually. The most common advice is to procure the scheme design with building-cost calculation based on the functional-analogy method from the consultancy company, with subsequent profitability calculations made by the owner himself. Collaboration between the owner and the consultant must be very close.

Cost and quality assessment

During the phase of needs and profitability analyses the owner’s subject for evaluation is the investment project, which involves all the building’s life-cycle phases including corresponding costs and revenues.

A. Building costs (capital cost, single cost):

- Costs related to site possession, including the price of the land, financial costs (loan interests), notary fees, state taxes and fees, survey fees, brokerage commissions, evaluation fees, court costs, land utilisation fees, charges for release from ties on property, recompense costs for rent contracts, costs for purchasing rights for the property.

- Costs of site preparation and occupation, including the costs for building protection and demolition as well as costs for elimination of threat, preparation of surface, replacement of restrictive utility networks.

- Cost of construction.

- Cost for furnishing the building.
Cost for the owner’s project management, investigations (needs and profitability analyses, feasibility studies), design, the owner’s construction supervision, recruiting and training the personnel to work in the prospective building.

Cost for technical equipment, for example, stage machinery in a concert-hall building.

B. **Exploitation costs** (only current costs, which depend on building costs, are listed):

- Heat, electricity, water, sewerage, communication costs.
- Maintenance costs for the building and its technical systems.
- Repair costs for the building and its technical systems.

C. **Exploitation-period revenue**:

- Revenue from the investment project.
- Profit from the sale of real estate.
- Profit from arisings after building demolition.

The determination of the quality requirements in this phase depends on the determination of the space-planning programme (functional quality) and on the calculation of the proportional split between building and exploitation costs. To accomplish this, it is necessary to balance the costs of building elements (non-recurring expense) and the cost of each element’s use (current cost) against one another, for instance:
❑ Building costs to ensure thermal insulation of the periphery structures (walls, roof, windows, etc.) – heating costs.

❑ Building costs for ventilation systems (for example, natural ventilation or a system with different heat-exchange systems) – ventilation and heating costs.

❑ Building costs affected by the life-expectancy of the roof material – roof maintenance and repair costs.

❑ Building costs depending on the quality of the external-envelope materials – external-envelope cleaning and maintenance costs.

The determination of the proportional split between building and exploitation costs depends on the owner’s relationship with the building after its completion. Depending on whether he will be an occupant or whether he is building for sale or for rent, or whether he is a public or non-commercial developer, his decisions tend to lead to economies in either the investment or exploitation costs.

Base for evaluating costs

When evaluating building cost in this phase, appraisals per square metre or per cubic metre – based on the functional-analogy or structural-analogy method – are used, with consideration given to the differences between the analogue and the building in development. Widely available cost-estimation software based on building space and room parameters can also be used. If the plot of land already exists, then the building’s quantities of external technical networks are measurable and the corresponding costs can be calculated. To evaluate the owner’s total project cost in this phase, it is necessary to add the following to the construction cost: 3% for the owner’s
investigations at the preparation stage, 5–15% for design, 0.5–1.5% for the owner’s supervision, 2–6% for the owner’s management and 10–20% for the owner’s financial cost and costs involved in obtaining the land. Costs for compiling the detailed plan as well as costs for connecting to the technical networks may be added to the above. This evaluation, based on specialised literature, is approximate although it gives an overview of the magnitude of costs.

For evaluation the owner should make price enquiries, use the services of consultants, investment and credit companies, study real-estate brochures and web portals. The error in the evaluation of building costs can be up to 25% in this phase.

Activities

- Drawing up the space-planning programme based on the company’s development strategy. This is based on technological schemes of production or other main activities, production capacity, reserves of raw materials and end product, number of employees in categories, transportation schemes, requirement for aid and service rooms, the location of businesses within the building and the need for parking within the site and outside the site. In the case of construction for dwellings, this is the point to determine the number of floors, apartments and their structure, as well as ensure comfortable conditions, extra needs of thermal and acoustic insulation etc. While compiling the space-planning programme, designers/consultants assist the owner as they possess empirical-data sets for space-planning or surface-planning needs (square metre or cubic metre per person, etc.).

- Functional objectives and chosen principles of dimension are given in memos, tables, (technological) activity schemes, plan briefs and room specifications.
In the case where the development objectives can be met through the reconstruction or renovation of existing buildings, suitability of the existing detailed area plan with the prospective building’s purpose of use should be determined.

Producing brief drawings of the building and the plot’s general layout with the aim of establishing dimensions. The listed drawings, together with the technical and economic characteristics, are retained with any explanatory notes about the initial amendments to the scheme design made during the phase of profitability calculation.

Determining environmental requirements.

Determining quality standards of rooms and plots (fire-safety category, heating, lightning, ventilation requirements, etc.). Quality requirements are designated as functional needs, not as specified solutions.

While determining the quality standards, the effects of quality on cost should be considered. In the preparation phase it is useful to use the above-mentioned estimating software that employs the space-planning programme and functional-quality characteristics of rooms and facilities.

Determining the transport and traffic schemes, and the plot’s maintenance requirements.

In the case of an industrial building, heat, water, gas, electricity and communication needs should be determined. Assessing the amounts of foul water and any harmful manufacturing waste (liquid, solid, gas) and the methods for disposal (or possible recycling). Initial environmental-protection calculations are made if necessary. For instance,
obtaining normative levels of gas waste depends on the height of the chimney and its distance from neighbouring buildings.

- In addition to the buildings, engineering facilities are listed on the site plan along with an explanation of their main technical characteristics. These form the basis from which to evaluate building costs in alternative solutions during the phase of profitability analysis.

- Determining the possible structural types of load-bearing elements and enclosures (roofs, walls, etc.), as well as possible heating and ventilation system alternatives, if the owner has his own such preferences.

- Preparing the list of necessary alternative solutions. Checking whether all the necessary initial technical characteristics for the project’s economic calculations have been established.

- Evaluating the project’s costs for all alternative solutions. It should be borne in mind that in this phase the evaluations should be made in both absolute values, in order to decide on the expediency of investment, and in relative values, in order to make a choice between the project’s alternatives.

- Choice of preferred profitability-calculation method. Two methods can be used (see Table 1):
  
  - Firstly, the net present value or cash flow method, in which, on the basis of the future accounting exploitation period’s revenue and cost, net profit is calculated by years and discounted to the year of investment in order to make it comparable with the capital (single) cost of the investment project. Using this method, the choice of
Table 1: An example of the effect of the choice of assessment method and length of accounting period on the choice of best investment project option

<table>
<thead>
<tr>
<th></th>
<th>option 1</th>
<th>option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment cost</td>
<td>20.0 mil €</td>
<td>15.0 mil €</td>
</tr>
<tr>
<td>Heating cost</td>
<td>0.5 mil €/year</td>
<td>0.9 mil €/year</td>
</tr>
<tr>
<td>Maintenance cost</td>
<td>0.6 mil €/year</td>
<td>0.6 mil €/year</td>
</tr>
<tr>
<td>Revenue from rent</td>
<td>3.6 mil €/year</td>
<td>3.6 mil €/year</td>
</tr>
<tr>
<td>Net profit</td>
<td>2.5 mil €/year</td>
<td>2.1 mil €/year</td>
</tr>
</tbody>
</table>

A. Internal rate of return
1) Assessment criterion: payback time
   - 8 years          7.1 years

B. Net present value
Assessment criterion: profit during assessment period

<table>
<thead>
<tr>
<th>Duration of accounting</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>period</td>
<td>2.5 \times 10 - 20 = 5 mil €</td>
<td>2.1 \times 10 - 15 = 6 mil €</td>
</tr>
<tr>
<td>2) 10 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) 20 years</td>
<td>2.5 \times 20 - 20 = 30 mil €</td>
<td>2.1 \times 20 - 15 = 27 mil €</td>
</tr>
<tr>
<td>4) 50 years</td>
<td>2.5 \times 50 - 20 = 105 mil €</td>
<td>2.1 \times 50 - 15 = 90 mil €</td>
</tr>
</tbody>
</table>

Remarks:
1) the choice of the best option from the two alternatives depends on the choice of criteria from 1 to 4 in the calculation above (best options shown in grey);
2) for simplification, the influence of possible changes to inflation and profit margins are ignored.

accounting-period length is important, and this decision must be made by the owner himself. In cases where a shorter period is chosen, the owner is opting for a higher investment cost, whereas in cases where a longer period is chosen, the emphasis falls on exploitation costs and revenue. This will, in turn, depend on the reason for construction: occupation, rent or sale. At this point it should be said that the economic accounting period does not coincide with the potential exploitation period. The exploitation period of a building is usually about 50 years. At the same time the building’s structural stability,
which is usually guaranteed, is not the foremost consideration but rather its function (target of use) and the comfort requirements that are linked to this function.

- Secondly, the **internal rate of return method**, which is generally used when assessing speculative business projects. The payback time in years is found as the ratio of investment costs to the project’s annual net profit. For example, there follows an illustration of the importance of time as a factor when making economic assessments of investment projects, or their alternatives.

- The owner’s required start and finish dates for the project are fixed, including corresponding dates for design and construction.

- The profitability analyses of the options and of scheme design can lead to changes in the company’s development strategy, including change in the initial conditions for the building and new technical and economic calculations. Certainly the scheme design and cost evaluations in this phase are approximate, although in the case of an industrial building only this method makes it possible to determine the minimum land size, with its presumption to solve the accompanying infrastructure problems.

- The profitability study ends either with the acceptance of the investment decision, or with the decision to stop the project.

- The approval of the scheme design in the profitability-study phase is given if the decision is positive.

**The outcome**

The results of this phase are fixed functional objectives, the space-planning programme, scheme drawings, the calculation
of the length of the building’s accounting exploitation period, profitability calculations and the investment decision.

**Activities directly following the investment decision**

- Seeking an appropriate *plot of land*.
- Requesting design conditions from the local authority.
- In cases where the land already exists, feasibility investigations should be carried out (probably not as many as for a new plot).
- In the absence of a *detailed plan* in the area where, according to the general area plan, it is necessary, or if the conditions shown on the detailed area plan are unsuitable, then the detailed plan should be created.
- Choosing a financial scheme.

### 1.4 Preparation of the financial scheme and loan contracts

**Preceding procedures**

Profitability analyses, and based on these, acceptance of the investment decision.

**Goal**

The goal is the planning of the cash flow and preparation of loan agreements for the project. It should be taken into consideration that in the comparative analysis of options the dynamic represented by financial conditions (inflation, etc.) is usually ignored because its effect on all the options is the same; however, this is an essential factor while preparing the finan-
cial scheme. The choice of the financial scheme depends primarily on the owner’s relationship with the building:

- The owner is the occupant – he intends to exploit the building in the long term, meaning that he will need a long-term loan.

- The owner is building for sale, which means that he needs a short-term loan and/or he involves the buyer’s and/or the builder’s finances.

- The owner intends to take a profit from the investment using rental income, requiring a long-term loan and/or involving the builder’s finances.

- The owner is a government, or a public institution or state is guarantor of the loan, in which case the conditions of financing are regulated by the state.

The owner considers the future costs of the project’s various stages in two ways. Firstly, the costs involved in purchasing the plot, building design and building erection can be described as ‘cheap money’ for the owner as it is borrowed, with payment coming from future project revenue. Secondly, the costs at the project-preparation stage, despite being lower in order of magnitude, are financed from the company’s current account and can therefore be described as ‘expensive money’ for the owner. In hypothetical terms: saving 1% of this ‘expensive money’ from the gross value of the project might result in the building becoming 10% more expensive, or there might be some loss in the project’s functionality, something that is not always easy to measure in financial terms.

**Executor**

Although solving the financial problems ought to be the responsibility of the financial specialists of the owner, rather
than being one of the construction client’s responsibilities, the investment’s building character dictates various specific considerations about the economics of the building’s life cycle, which necessitates the involvement of a specialist in building economics (the quantity surveyor).

Activities

- Preparing the initial calendar plan of the project and its approval.

- Determining financial schemes and potential sources: the owner’s own resources, loans, the resources of the builders and the building’s occupants, share sale, possible subsidies, etc.

- Forecasting the project’s rate of profit, rate of loan interest, buildings’ cost index, inflation rate, rent and sales prices during the period of the financial plan. Identifying the amounts of the necessary fees.

- Producing the financial plan. One month is recommended as the unit of time interval to guarantee the necessary accuracy of discounting following the phases of project development.

- Determining borrowing objectives: the costs of the project-preparation period preceding design, purchase costs of the plot of land, design and building costs. It should be remembered that building costs do not usually cover all possible costs, for instance, the cost of purchase, installation and commissioning of technical equipment needed for production in the erected building.

- Determining the length and stages of the loan period (short-term and long-term loans).
If it is possible to divide the building’s implementation into sequences, then it should be calculated in positive (profit) as well as in negative (cost) cash flow. It is important to include the division of the implementation of the building into stages in the initial task for design.

The financial plan should include steps (project-development time milestones) to specify the project’s costs and the costs of corresponding cost calculations. From the viewpoint of the building’s project development, the following milestones would be typical:

- completion of feasibility studies and corresponding phase of scheme design, during which the ceiling price of the building is determined, from which the designer should work;

- approximately 30% readiness of the preliminary design (general solutions are chosen), when making changes in the project (design) with the aim for correct, controlled construction costs that do not involve a large increase in design costs;

- 100% completion of the basic design;

- building contractors are chosen and contracts are signed;

- final settlements are made with the building contractors.

Preparing the short-term loan conditions relating to the reimbursement of the feasibility-studies and multiple-option scheme design expenditure. A corporative or project-based loan could be used – and it might be practical to repay that loan from the project-based long-term loan.
Preparing the long-term loan conditions.

Considering the possibility of a mortgage for the loan.

Evaluating project risks outlined during the project-statement phase (see Section 1.1). Based on experience, there should be a reserve in the financial plan of not less than 10%.

Preparing the financial plan in the form of charts and tables.

The outcome

Project calendar plan, cash-flow plans, financial sources, financial scheme for project financing, mortgage-appraisal documents, financial contracts.

Activities that follow directly after the formulation of the financial plan and preparation of the loan conditions

Signing the loan contracts, land purchase.

1.5 Preparation for land purchase and corresponding contracts

Preceding procedures

The investment decision is approved. The requirements resulting from the needs and profitability-analysis phase are determined: the size and shape of the plot of land, distance from the transportation network and any financial restrictions applying to the purchase price. Searching for a suitable plot of land should begin before the end of the profitability analyses.

Goal

The goal is to obtain a suitable plot of land or acquire the leasehold of such a plot of land. Apart from this main goal, the following should also be taken into account:
❑ Purchase of the land could be a profitable long-term investment separate from the building-investment project.

❑ The land should be saleable in a short period if, during project development, it turns out that construction on the plot is impossible because of a conflict arising from the design requirements, owing to environmental reasons or the neighbours’ interests, etc.

❑ The need for possible enlargement of the company activities in the future.

Executor

The executor of the land purchase is the owner himself, or his principal adviser or the professional construction manager. Using the help of real-estate companies is not recommended as a conflict of interest could arise as they are the biggest landowners and their recommendations could have self-seeking interests.

Cost and quality assessment

The land’s value depends on:

❑ Distance from the transportation network (harbour, railway station, etc.) or from raw-material sources.

❑ Existence of facility networks (incoming services, etc.).

❑ Binding prescription of land use according to the approved detailed area plan and the possibility of its change arising from the higher-level area plan.

❑ Restrictions for building, i.e. the number of structures on the plot, determined by the detailed area plan.
❑ Limits on building height, maximum size of the building area of the plot, etc.

❑ Aesthetic considerations.

❑ Neighbourhood.

Depending on the particular investment project, the importance of these factors will vary. The most important factor might be the distance from the catchment area or centre of attraction.

Prices of suitable plots vary widely and depend on supply and demand, in other words, on general investment trends. To obtain an overview of current market prices the owner should compile a list of the sites available. This should be done during the profitability analyses, prioritising sites according to the value characteristics that are important for the project. At the same time the owner should determine the maximum price he can afford to pay. To do this, the design, building, building-management and supervision costs should be deducted from the investment costs calculated in the profitability analyses. In cases where the project is an industrial building, alternative calculations should be made taking into account the end-product and raw-material transportation costs, the latter depending on plot location. At the same time variations in salary should be considered – it may be that the more distant the site is from a local centre, the lower is the salary.

Activities

❑ Advertising the desire to purchase in real-estate brochures and web portals.

❑ Analysing the sales advertisements placed in real-estate brochures and web portals.
☐ Dealing with enquiries from real-estate companies.

☐ Consulting with local-government land experts.

☐ Inspecting suitable plots of land; negotiating with landlords.

☐ Carrying out feasibility studies (see Section 1.6). Leaving aside some steps in the feasibility studies prior to land purchase increases the owner’s risks significantly, and, as the time saving is less than one month, it is inadvisable.

☐ Making the decision on the purchase of the land.

☐ Requesting purchase permission from local government. Even if the law does not require this permission, it is useful to obtain it anyway in order to reduce the owner’s risk, especially when dealing with a larger project and there is a need to change the purpose of land use as specified in the detailed area plan. In some circumstances it is necessary to request permission from the authorities, for instance, when the plot is agricultural land and the purchaser’s aim is to use it for a purpose other than agriculture, or when the purchaser is from a different country.

☐ If the purchasable real estate needs to be divided, then geodetic measurements should be made and a site plan drawn up, and both should be submitted to the local government for approval.

☐ If there is a need to produce a detailed area plan, then an agreement of cost distribution between the buyer and the seller should be made.

☐ Drawing-up the servitude contracts. Servitudes could be necessary for the land in favour of neighbouring plots, or vice versa.
Preparing the purchase–sale contract together with an attached plan of the land. If there are any doubts concerning the project’s development result (detailed area plan approval and change of land use, acquisition of real estate, etc.), then the contract should contain warranties and other conditions to decrease risk.

Determining the division of the transaction cost (notary fee, state fee, etc.).

The notary should prepare the contract, which should then be signed.

Registering the acquisition of the real estate.

The outcome

Comparison charts of suitable plots of land with criteria assessments, details of plot inspections, minutes of the meetings in which these decisions were made, preliminary contract, application for purchase (if required), plans and contracts of any servitudes, purchase–sale contract, real-estate registration documents.

Activities that follow directly after making the land-purchase decision: completion of feasibility studies.

1.6 Feasibility studies and corresponding investigations

Preceding procedures

A plot of land satisfying the conditions of the development project is found.
Goal

Finding the natural, technical, juridical and economic conditions for use of the proposed land. If there are buildings or other objects on the land, the investigations include these as well.

Executor

The executor is the owner himself, with the help of his adviser. Using the adviser at this point makes it possible to substantially reduce the time taken. Advice can be obtained from the principal procurement adviser, from the professional construction-management company and from the design company.

The basis for cost evaluation

The initial data for estimating construction costs in this phase come from the plan of the land, the schematic plans and sections of the building from the profitability-studies phase. From this base it is possible to establish rough measures for the infrastructure facilities and identify the area and volume of the building. The plot plan will be sketched with roads, courtyards, technical facilities, water supply and rainwater disposal, waste disposal, landscaping, fences and communications. For industrial buildings the initial data include the technological schemes of production, capacities of raw materials, ready production and waste, the dimensions of production lines, the height and fire-resistance of rooms, schemes of ventilation and lighting, etc. Often the owner already has some preferences about building materials in this phase, for example, the material to be used for floors or external coverings. The scheme design of the feasibility-study phase is at the same time a suitable initial base from which to derive the detailed area plan.
and the detailed and complex design; it can be used as an appendix to corresponding contracts. Norms for cost estimates relating to this phase are the same as those relating to the profitability-study phase. Calculations will be amended based on specified measurements, the layout of rooms and other specific needs for the conditions of the rooms. Additional data relating to any external facilities on the defined plot of land make it possible to decrease the estimating error from 25%, during the profitability-study phase, to 15%. The cost appraisal of this phase can be used as the specified ceiling price for the designer.

**Duration of the phase**

The duration of activities is at least 1 to 4 weeks, using an optimistic appraisal. This optimistic appraisal depends on combining activities from a timescale point of view. This can be argued for on business projects with high profit levels. Arranging activities so that they follow one after another substantially prolongs the duration of the whole project. However, performing these activities simultaneously does increase the risk to the owner.

Shortening the duration of this phase by cancellation or postponement after land purchase also increases the risk to the owner and likewise increases the risk of error in cost appraisal. The detail level of the feasibility study establishes the presumption to ensure the minimum total duration of design and construction.

**Activities**

- Negotiating with local government with the aim of obtaining preliminary approval for the building-development plan. A negative position within the local authority or community hints at the possible need to find a new plot of land.
- Becoming familiar with the community’s or town’s general area plan and the detailed area plan of the plot, with the aim of understanding all restrictions and conditions on land use, as well as those applying to the buildings on it. Clarifying from the general area-development plan: traffic schemes, water and electricity supply, environmental (natural and cultural) restrictions, etc.

- In the absence of the detailed area plan for the land concerned, in a district where, according to the general area plan, one is necessary, becoming familiar with local practice in the drawing-up and agreement of the detailed area plan.

- Becoming familiar with cadastral, real-estate and building-register data, as well as with the documents that approve ownership of real-estate and rental contracts.

- Performing actions arising from the necessity of dividing, measuring and registering the acquisition of real estate.

- Performing actions relating to the control obligations covering property using the real-estate register, real-estate mortgages, contracts of servitude, rent contracts, etc.

- Becoming familiar with any plans submitted by neighbours and owners of infrastructure facilities. If necessary, obtaining relevant agreements from neighbours.

- Becoming familiar with the cadastral register in order to establish whether any restrictions are applied to the holding of this plot.

- Investigating geological conditions, such as ground-bearing capacity and hydrological conditions (for example, the level of ground and aquifer water, water resources), using archive
data from the relevant authorities. If necessary, carrying out additional investigations.

- Performing preliminary assessments of environmental impact.

- Becoming familiar with any restrictions in relation to protection of nature, culture or antiquity.

- Becoming familiar with conditions for foul and surface-water drainage (including the use of gravitation for drainage) and requirements on treatment of foul water.

- Becoming familiar with access conditions onto local main roads (using the local authority’s general area plan of community development and the road authority’s development plans).

- If the project involves hazardous substances such as dangerous gases, special preliminary calculations must be made taking into account the necessary safe distance from neighbouring buildings.

- Examining existing buildings and facilities on the site.

- Establishing the conditions under which the project interfaces with existing infrastructure systems (technical and economical), requesting the official documents to enable connections to this infrastructure (authorities usually require that their own printed forms are used).

- Finding geodetic and topographical plans of the plot. If these do not exist, it is necessary to requisition measurements while the land-purchase contract is being prepared.
Inspecting the nature of the plot in order to determine the conditions that will affect construction. It is necessary to inspect the plot to assess it as a building site because the cost of temporary works and facilities make up 1–12% of building cost, depending on the site conditions and the type of structure. For dwellings and office buildings in built-up areas, it is usually 3–5%. Site conditions also influence the duration of construction, which will have an impact on construction cost and revenue to the owner. If a shortening in construction duration is planned by operating three shifts, the construction costs will rise by 5–6%. If the project is a commercial one with a profit margin of about 10%, then the owner’s profit from shortening the duration of construction (by an earlier start date to receive profit and decrease financial costs) will increase by double the amount of the costs payable to the builder. Factors influencing building-site costs are: the size of site and its access; whether existing buildings and facilities must be replaced or demolished; buildings, roads and any adjacent land features such as trees requiring special protection; restrictions on the height of cranes; special restrictions on working in the evenings and at night, etc.

Controlling the influence of site location on the project’s programme requirements (start and finish dates, duration).

Assessing the results of the activities listed above and deciding if they give reason to buy the chosen plot of land.

The scheme design of the profitability-study phase must be detailed and the cost estimate and calendar plan of the project must be updated to take account of results at this stage.
- Approving the *ceiling price* and the duration of the project as input data for the next steps in the project development.

**The outcome**

Assessment of the plot of land. If there are existing buildings and facilities on the plot, the examination of their technical condition. Decision on the suitability of the land for construction based on an understanding of all relevant documents connected with the plot, or on the restrictions of use revealed during a site inspection. More detailed scheme design (than in the profitability-study phase). The calendar plan and cost estimate (based on the functional or structural analogies) taking into account the condition of the plot, as well as logistical and infrastructure costs.

**Activities following the feasibility study**

- Decision to purchase the land.

- Preparation of the land-purchase contract.

- Application to local government to start detailed planning.

- Application to obtain technical specifications from local government for design.

- Application to obtain technical requirements to enable connections to infrastructure facilities (electricity, water, gas, sewerage, roads, railway, etc.). By law the owners of infrastructure facilities have one month to respond. To find acceptable conditions may need much more time.

- Development of the plan of necessary servitudes.
Development of the scheme of procurement and priorities first planned during the phase of determining the scope of the project, using the help of professional advisers.

1.7 Detailed area planning

Goal

The goal of the detailed area plan is to set up through local government – in the towns, villages and other areas that necessitate the use of such a detailed area plan – the land usage and building conditions. It might be necessary to create the detailed area plan if any dividing or joining of land accompanies the registered land purchase, or if there is a need to change the land use from its purpose as designated in the detailed area plan. The cost of the land can therefore depend on whether a detailed area plan has been created, and on the land use as designated in the detailed area plan.

Executor

Local government will arrange the preparation of the detailed area plan, sometimes by assigning a third party. The draft detailed area plan can be drawn up by an architect. Usually the real-estate owner requisitions the work from a design company. In order to save time and money, it is possible to receive the detailed plan from the same design company who assisted the owner in preparing the profitability and feasibility studies and the needs analysis. Several groups are involved in the processing of the detailed area plan: the owners of real estate within the planning area, local residents and other interested parties.

The cost of producing the detailed area plan depends to a great extent on the specific project, the site’s characteristics,
environmental conditions and the need to evaluate the environmental effect. The current cost is approximately one thousand Euros per hectare of land.

The timescale when producing the detailed area plan is divided into two phases. Firstly, the formulation of the outline detailed area plan, which could take 1–3 months. Secondly, the process of coordination and approval of the detailed area plan leading to its implementation, which could take 3–6 months; however, if there are conflicts then it is hard to predict the time required. If the owner foresees that implementation of the detailed area plan could take significantly longer than other pre-construction stages, then it is possible to start design before implementation of the detailed area plan in order to shorten the project’s overall duration. However, this happens at the owner’s risk – the owner cannot apply for building permission from the local government before the detailed area plan has been approved.

Activities

❑ Applying to local government to produce the detailed area plan. Waiting for the local government’s decision to take action.

❑ Signing the agreement with local government concerning the composition of the detailed area plan and delegating this to the design company responsible for the detailed area plan.

❑ Compiling the initial data required for detailed planning. The scheme design made during the feasibility-study phase (see Section 1.6) should comply with these initial data. This is the time to address the owner’s requests concerning any division of land into smaller plots, as well as road access and traffic regulations, planting of trees and greenery, the
required surface area of the buildings, the shape and height of the buildings and their required number, the allocation of facility networks, the purpose of the plot’s use, potential threats to the environment (harmful waste and raw materials, etc.), variation from the general area plan, required servitudes, etc.

- The agreements and the tasks required to be carried out will be listed in the initial conditions from the local government, such as the required number of plan documents (including whether they should be submitted digitally), the required scales of the drawings, etc. If at this stage there is the need for a preliminary evaluation of the environmental effect, then it would be advisable to follow the same procedure as that used in the project’s final phase, in which the application for building permission will be made. It is obvious that during design development most of the parameters will become more specific, although repetition of procedures is normal and saves the owner time and cost in subsequent stages.

- Finding the appropriate design company. Negotiations and contract-signing take place through the same procedures used during the construction-design phase (see Chapter 3).

- Accepting the draft detailed area plan. Owner’s examination and approval.

- Submitting the detailed area plan to local government for treatment. Local government then follows subsequent procedures in the order listed below, which means an unavoidable waiting period for the owner. Timescales (enforced by law) are given in brackets and may vary from country to country:
• decision to start processing the plan (1 week);
• notice of detailed-plan initiation published in the press (1 week);
• public display of the plan (2 weeks);
• notification of public debate (1 week);
• public debate and action on the results (2 weeks);
• amendments to the detailed plan and, if necessary, resolving conflicts with local government (4 weeks);
• acceptance and implementation of the detailed plan (2 weeks).

It should be emphasised here that the points above represent only those procedures that cause unavoidable waiting time for the client (arising from legal requirements). They do not include the whole list of procedures that may occur during detailed area plan development.

From experience it is possible to conclude that, on average, the duration of the detailed plan’s implementation from start to finish will seldom be less than six months and, in cases where there are disputes, it could be several years.

The outcome

Application to initiate the detailed plan, contract with local government, requirements of local government for detailed plan, owner’s initial data for the detailed area plan, contract with the design company to prepare the detailed area plan, submission of plan for public debate, amended and approved detailed area plan.
1.8 Scheme design

Preceding procedures

As building design (Chapter 3) is completed in stages (preliminary design, basic design and working drawings), the project-development preparation process (Chapter 1) is also divided into stages, as described in Sections 1.1 to 1.7. During the design phase, progress to the next stage is possible only when the earlier stages are approved, and the same is true of the preparation stage of project development. As the building project (design) is the prescriptive model of a building, so scheme design is the model for a building’s development project. If we have agreed that the notion project in the building context has two different meanings in several languages, then the notion scheme design can also be used in two different ways: the first is how designers understand this notion, and the second is how the owner understands it. The latter entails a complexity of documents produced from the results of the owner’s activities during the preparation stage of project development, collated systematically to ensure effective appraisal of the project using three criteria: cost, quality and time. The phrase ‘owner’s activities’ is used despite the input of external specialists, since the owner is the only decision-maker at this stage. This entails a summary to determine the needs and possibilities, the approval of which gives a premise with which to go forward to the next stage: that of building design. It is obvious that there will not be enough architectural drafts to obtain approval for the development project, and, in addition, there must be technological solutions (buildings are not just dwellings), a project cost evaluation, an initial calendar plan setting out dates for the signing of financial agreements, local government agreements about land use, a preliminary procurement scheme, planned price mechanisms and much more, as described above. Building-design schemes form only one
part of scheme design. Scheme design is the outcome of the owner’s entire work. It is possible to reduce costs at the preliminary-design stage if in the early stage of preparation the owner involves designers capable of integrating technological production schemes with building and site drafts, and thus offering alternative solutions using CAD programs. Later in the project, producing alternative solutions becomes more expensive and their effect becomes smaller. For this reason it is necessary to have a comprehensive definition of the owner’s possible activities and a detailed plan of their outcome.

For simpler projects it is not essential that all constituent activities are detailed in writing or drawn up using CAD programs. The important factor here is that the owner has a precise idea of his possible activities and reaches the relevant decisions.

Goal

The task of scheme design is to set down step by step the owner’s ideas, making the overall project’s statement (goals, scope, etc.) more detailed, and developing it during the needs analyses, profitability and feasibility studies, preparing the purchase of land, formulating the project’s financial plan and the property’s detailed area plan. Thus, scheme design can be defined in two stages: scheme design based on the profitability-studies phase, and scheme design based on the feasibility-studies phase. In practice the results of the named phases must not be compiled separately in the named folders. The desired outcome is recording the list of completed decisions of the phase. Separate folders are recommended if external consultants are used. Questions and answers relating to the listed phases are presented in Sections 1.3 and 1.6. For maximum efficiency it is possible to use scheme design as an integral part of the initial task for the detailed area plan (if the project requires an area plan) and for the preliminary design. In scheme design, the following should be formally presented:
- The project’s general characteristics.

- Ground plan of the building plot (site) with engineering networks and floor plans and sectional sketches of the building’s structure.

- Sketches of production technology, building functions and the movement and transportation schemes that are linked to the site and floor plans.

- Architectural characteristics.

- Characteristics of the building structure, if the owner has specific requirements for such characteristics.

- Preliminary data about building geology, the site’s geodetic and topographical plans.

- Requirements for the following (necessary to formulate for the initial task of design): water supply and sewerage, heating, waste management, electricity and communications installations, fire protection and sprinkler systems.

- Schedules of professionals occupying the building, functional requirements of rooms, welfare facilities and ancillary buildings, technological schemes for which the building will be erected, etc.

The client does not have the required knowledge to formulate or answer all the above questions. For that reason it is useful to procure the scheme design from the design company, and involve them during the needs and feasibility analyses (described above). During the first options of scheme design this enables contemporary design technologies (CAD methods, etc.) to be implemented, providing an assurance that different
elements of the project are congruent and also reducing workload, time and cost in the next stages.

Costs in the scheme-design phase, especially in the phase of the profitability studies, are relatively low for the owner compared to the costs in the next stages (design and building). However, the effect of the decisions on overall project effectiveness is most significant, and therefore it is not prudent to abandon the multi-option approach during scheme design in order to reduce costs.

Activities

❑ When using external consultancy services, it is useful to follow the procedures described in Chapter 3 for this phase, as it involves the search for the design company and management of design work. If all design work is procured from the same company, a framework contract should be considered, which can later be detailed with contracts for every phase, signed after the owner’s approval of the results of the preceding phase.

❑ Space-planning programme development, together with rooms’ fire-safety and quality-standard classification; determination of room exploitation (number of personnel, utilisation intensity of the rooms, utilisation requirements) and maintenance objectives (heating, water, electricity, cleaning, maintenance of external areas, etc.), as well as a description of ongoing preventative and regular repairs – maintenance that ensures the preservation of the original quality.

❑ Agreement upon the number of drawings copies to be handed over (including CDs).

❑ Agreement upon the structure of the estimate (budget) for the current stage.
- Ascertaining the necessity of a preliminary evaluation of environmental impact; subsequent evaluation and, if necessary, acting upon the results.

- Specifying the calendar plan. In the general calendar plan the waiting periods for official permissions are outlined. The method of procurement, the limits on the start dates of design, construction and occupancy are taken into account, along with amendments, debates, etc. The importance of the time criterion and the division of the risk between cost and time should also be considered, as should the effects of seasons.

- Approving the calendar plan.

- Adjusting and approving the cost-breakdown budget. The budget is formulated using the structural-analogy method and is categorised into subdivisions according to the building’s cost-classification standard.

- Determining the ceiling price of the building; the general designer should consider the ceiling price and the choice of the scheme to achieve it (and the motivation scheme); these may be imposed through the design contracts (see Section 3.3).

- In the case of design and build procurement schemes, determining the project’s target cost (‘project’ in its larger sense), including all costs to the owner. An explanatory note could be added to the target cost, listing works and supplies that have not been taken into account but which are necessary for the full exploitation of the building.

- Approving the scheme design.
The outcome

The scheme design in the form characterised above comes about as a consequence of the needs, profitability and feasibility analyses and the development of the detailed area plan through systematic and multi-option calculations, using the support of the design company in the early stage of development.

The alternative to scheme design is to perform the calculations and analyses separately, although in this case the data are frequently not interlinked and lack the element of cost calculation. If the initial task for complex design is not produced on such a basis, then project development may not result in the design-stage achievement of the client’s specific targets on cost, time and quality.