

Estimating in Heavy Construction

Roads, Bridges, Tunnels, Foundations

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1 Strategy and estimating

It is more important than ever to follow appropriate strategies to be competitive; even more so in difficult economic times. The implementation of the strategies must be supported by efficient management.

1.1 Sales and marketing strategies

There are three different core area strategies available for the contractor, which can also be combined:¹⁾

- Niche strategy (specialization): In this strategy, the main task is the concentration on niche markets. The company focuses on a specific, narrowly defined industry segment. These niches can include, for example, a specific purchasing group, a specific part of the performance program, or a geographically defined market.
- Cost leadership: This strategy aims at being the cheapest provider on the market. A comprehensive cost advantage should be reached within the branch by means of this strategy. This requires, for example, cost-cutting measures, strict cost control, and minimization of costs in certain areas, such as service or marketing.
- Comprehensive services (differentiation): The goal of this strategy is to offer services, which differ greatly in quality and variety from the services offered by the competition. By achieving a unique position against the competition (i.e. unique services), it is possible to overcome the cost-cutting strategies of the competition.

It is questionable whether a typical construction company can aim to make its sales entirely in niches. One does certainly strive strategically to save a certain share of revenue from the intense price competition.

In many cases a price war cannot be avoided. Cost-effective competitiveness can only be achieved through rationalization, utilization of the learning effect, and skillful procurement management (of construction materials and subcontractor services).

Niche and cost leadership strategies are particularly practicable for providers of individual trades. The differentiation strategy, on the other hand, is closely bound to the market presence of system providers²⁾. Table 1.1 describes both forms according to characteristics such as size of the company, depth of production, price margin etc.

1) Cf. the three types of competitive strategies: Porter (1999), pp. 70–85. To the topic of EU-eastward expansion: Jacob / Mollenhauer (2002), pp. 52–72 to the operational strategies of the domestic market penetration and Birtel (2002), pp. 73–82 to the operational strategies of the opening of the construction markets in the accession countries.

2) For the characteristics of the system provider cf. BWI-Bau (2013) p. 158.

Table 1.1 Characteristics of single trade and system providers³⁾

Characteristic	Single trade provider	System provider
Size of the company	Small and medium-sized enterprises	Medium-sized and large enterprises
Scope of operation	Regional and superregional	Superregional, international
Depth of production	High	Low
Price margin	Low to large	Middle
Range of services	Homogeneous	Heterogeneous
Service program	Single crafts	Complete solutions
Position in the market	(seldom) Awarded to sub-contractors, or subcontractors themselves	General company, general contractor, project company, consortium leader
Indirect resource demands	Handcrafting, technical, economic, tax and legal know-how, innovation know-how, competence in problem solving	Moreover: coordination and organizational know-how; integration know-how

Not only is the definition of the strategy of practical relevance, but its execution is as well. Examples of the reduction or expansion of value added are provided in the construction business management working group, Schmalenbach-Gesellschaft⁴⁾. The balanced scorecard offers one possible instrument for the successful implementation of strategies in enterprises.⁵⁾

It is always important to know one's strengths and weaknesses. Which special benefits can one offer the customer in comparison to the competition? Where are the central needs of the market? Ultimately the question arises, where one can stand reasonably in regard to dependence on customer benefits and central market needs.

3) Stuhr (2007), p. 57.

4) Cf. optimizing the results with FOKUS and Reduction of real net output Adenauer (2005) pp. 25–36 and extension of added value in a mid-sized company Schmieg (2005), pp. 37–48.

5) Cf. construction-related application balanced scorecard Stuhr (2009), pp. 14–16.

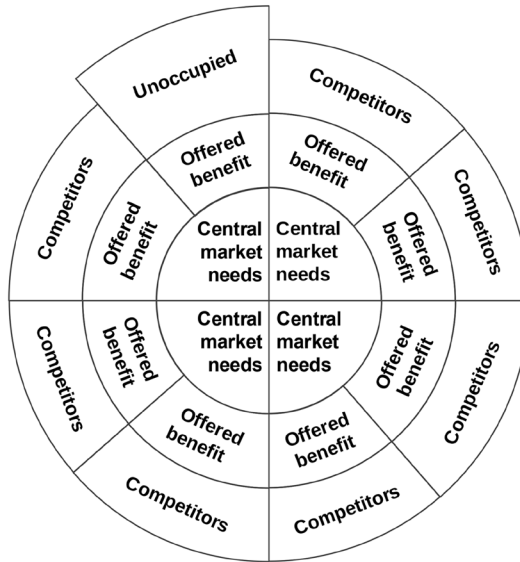


Figure 1.1 Optimal positioning in the sales market⁶⁾

The results of customer analysis, competitor analysis, analysis of one's individual situation and, finally, positioning in the market influence the preselection of bids. The preparation of an offer involves considerable time and effort. The calculation process requires personal and financial resources. In this way, the company faces order procurement costs:

Order procurement costs = ‰ Costs of volume of supply x hit ratio

Limit: Order procurement costs ≤ 2 ‰

The order procurement costs should not exceed two percent. Two strategies are conceivable (cf Figure 1.2):

1. The company always offers and calculates only superficially. The comparatively low bidding costs therefore result in a poor hit rate: approx. 20 inquiries must be processed in order to receive an order.
2. The company selects the inquiries that best correspond to the chosen enterprise strategy for the range of products and services. The offer is vetted and fundamentally calculated. The higher costs are thereby leveraged by a higher hit ratio (only approx. four cancellations per hit).

6) Cf. Weissmann/Schwarz (1997), p. 110.

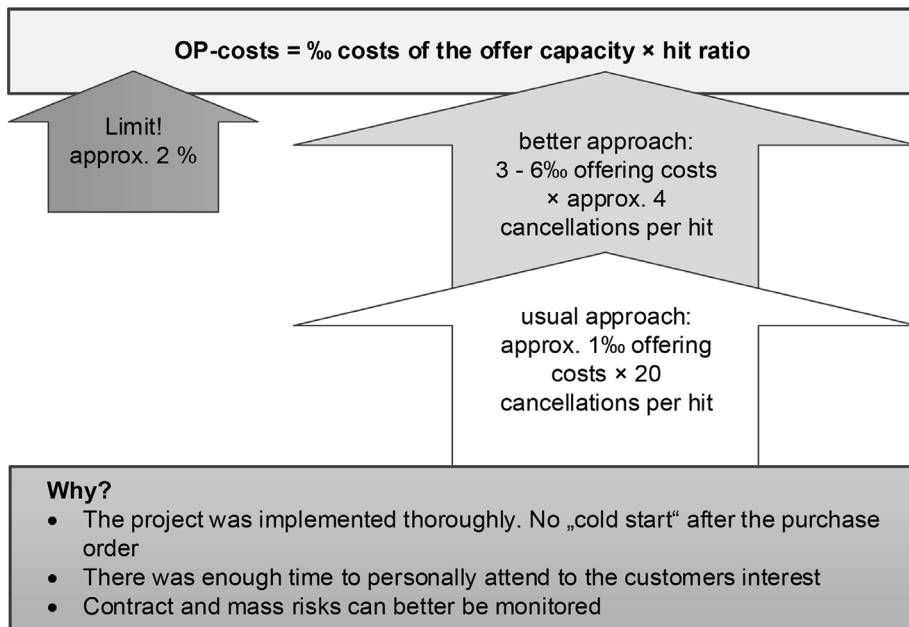


Figure 1.2 Order procurement⁷⁾

With the second strategy there is no cold start after the placement of the order. Enough time remains to attend to potential customers and learn about subjective aspects. Contract and mass quantity risks are also more under control. This only works when inquiries are selectively processed. Thus the strategic preselection of bids is of utmost importance.

For defining a result-driven strategy for the preselection of bids, customer analysis, competitor analysis, analysis of individual situations, and, finally, positioning in the market are necessary (cf. Figure 1.3). This strategy must be constantly adapted and modified by management to complement the current situation.

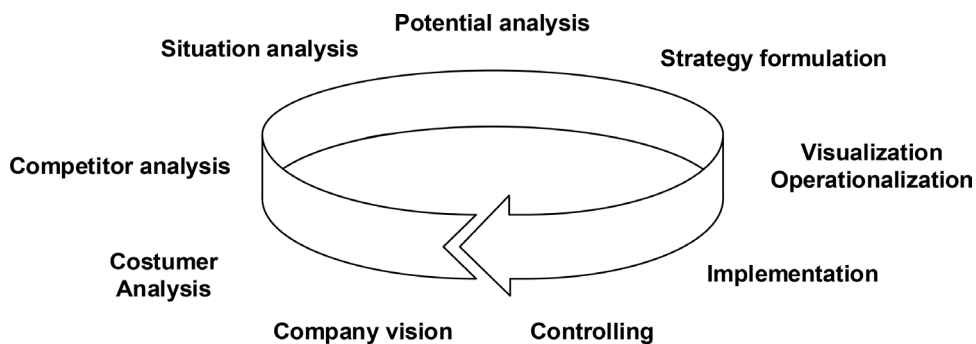


Figure 1.3 Strategy and management

⁷⁾ Hochtief Software GmbH, Essen.

1.2 Production and procurement strategies⁸⁾

In the construction contract, the construction company is engaged as the contractor, the construction product suppliers and manufacturers as subcontractors. For the completion of a structure, please see the indicated academic literature on construction business management.⁹⁾

Procurement strategies

Together with the procurement of construction materials, equipment and subcontractor services, it is possible to distinguish a strategy among the dimensions of high-need fluctuations, purchasing market complexity, and importance of the procurement procedure for the company¹⁰⁾. With individual production, it is possible for individual procurable product needs to arise from high need fluctuations; accordingly, the procurement portfolio is developed from the dimensions of high need fluctuations, purchasing market complexity, and importance of the procurement procedure for the company. To investigate the importance of the procurement process, the ABC-Analysis can be applied. Using this method, the goods to be procured can be classified as follows:

- *A-Goods* cover a very high percentage of value consumption every year
- *B-Goods* approach a mid-ranged percentage of value consumption every year
- *C-Goods* are characterized by a low percentage of value consumption every year

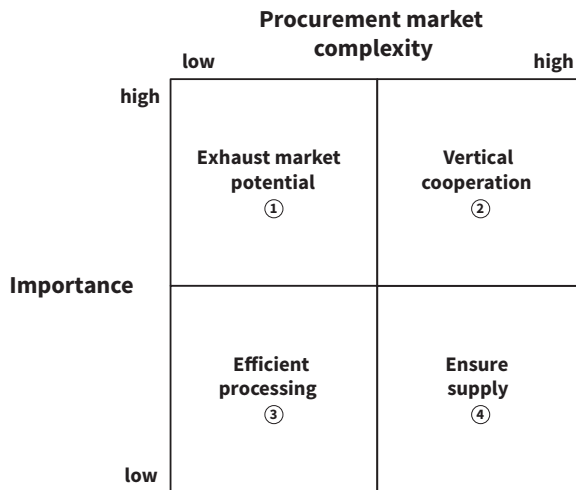


Figure 1.4 Procurement strategies

8) Weissmann/Schwarz (1997), p. 123.

9) Cf. See also e. g. Berner/Kochendörfer/Schach (2013) and Berner/Kochendörfer/Schach (2015).

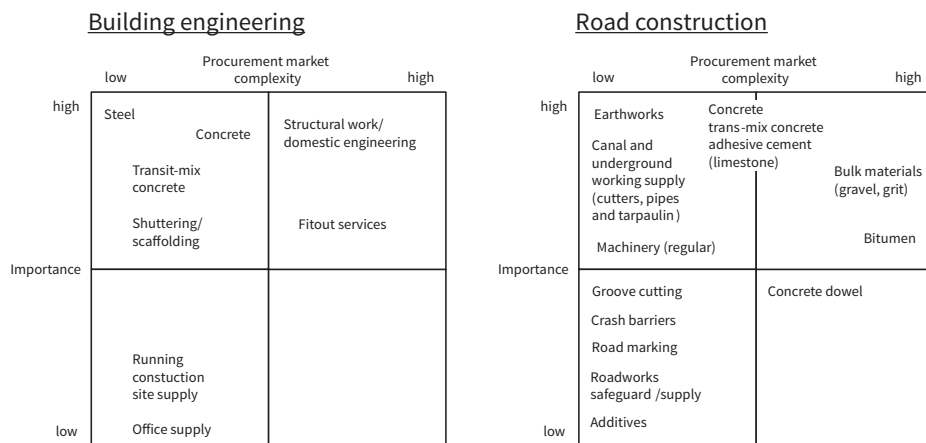
10) Cf. Hamm (1997). Especially for purchasing subcontractor services, Jacob/Leinz (2005), pp. 5–7.

The individual fields of the procurement portfolio can be arranged in the following strategic options:¹¹⁾

- With low procurement market complexity, a market-oriented approach is used (market-oriented procurement process type), i. e. the market potential is exhausted, as the provider with the lowest price is chosen (Field 1 in Figure 1.4).
- If the procurement market complexity is high, a careful approach in the form of vertical cooperation is advantageous (risk-induced procurement process type (Field 2 in Figure 1.4).
- With low procurement market complexity and low procurement importance of goods, a strategy of efficient management and/or the minimization of transaction costs come into play (Field 3 in Figure 1.4).
- For goods whose procurement market complexity is high, but which are of lesser importance to the company, the supply should be strategically provided for (Field 4 in Figure 1.4). This can be achieved, for example, by backing up the supply with not only one, but two suppliers or by increasing the quantity stored.

Appropriation to the sectors of the construction industry

The individual fields of the procurement portfolio can be arranged by their compatibility with other purchased goods in their sector. In Figure 1.5, there are outstanding examples of companies and their corresponding sectors, namely building construction, road construction, specialist foundation engineering, and steel construction. Thus, not only the purchasing volume but also the critical path of a construction site define the meaning of a procurement system.



11) Cf. see also Jacob (1998), pp. 40–45 and Leinz (2001), pp. 10–12.

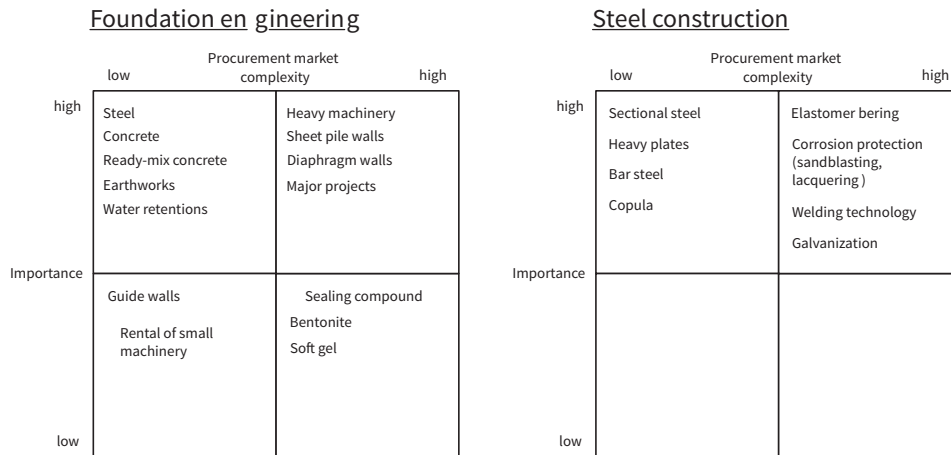


Figure 1.5 Procurement portfolio dependent on the sector

For instance, the procurement strategies must be supplemented in the building construction sector:

- The *exploit market potential* strategy is especially suitable for construction materials such as steel or cement. Moreover, low complexity on the procurement side also includes the required support supplies, such as construction devices and machines, as well as formwork and scaffolding in building construction in general. Diverse contractors, who all offer comparable qualities, exist in the market. The importance of the procurement categories is, therefore, particularly high for the company because of the quantities to be built and the required time.
- A *vertical collaboration* is recommended for subcontractor assignments such as construction excavation and structural work, for home utilities and for general finishing work. If one pursues the development of the classic company to become a full-service provider, the increasing importance of the subcontractor assignments becomes apparent. The subcontractor portion for mid-sized companies can also amount up to and even surpass 50 % of the entire purchasing volume.
- The *efficient settlement* strategy is of importance for the so-called C-Goods and everything that falls under the category of overhead. Examples of C-Goods include objects for the continuous construction site supply; overhead products refer to procurement supplies of general business activities such as office supplies. These are less important for the purchasing volume of the company.¹²⁾

Price escalation clause

A price escalation clause is an agreement between producer and customer which makes the sales price dependent on the development of a command variable between a basic and a revised amount (i. e. price index, market price, procurement costs of the production factors). Full and partial clauses differentiate from one another. In the case

¹²⁾ Concerning the optimal purchase strategy of C-goods and overhead products cf. Hamm (1997), p. 139 ff.

of a partial clause, only a part of the sales price changes with the command variable. An exact definition of the basic and revised amounts is essential in this context.

With the completion of long-term contracts, as construction contracts are represented, the customer should be aware of price risk on account of the contractor (risk of retroactive price adjustments for input factors) due to the agreement of price escalation clauses. The establishment of the price thus depends on the development of specific cost indicators. To this end, a price escalation clause is made, which establishes the included cost factors and their appropriate quantity.

In the German construction industry, material price escalation clauses are used for steel¹³⁾ and for public construction contracts in road and bridge construction¹⁴⁾. In this way, the additional or lesser expenditures for every material listed in a catalog will be recalculated using the difference in price on the day of construction. Another possibility is to use the market prices previously given by the contractor and their associated catalog date (generally the time of shipment of quotation documents at net price). With this agreement, financial problems still arise. The price that a construction company actually has to pay for construction material is determined at the time of purchase and not at the time of use. Because the market price can nevertheless have changed again between the time of purchase and use, a disadvantage or advantage on behalf of the contractor is not to be dismissed. For this reason, it would be financially justified to have a price escalation clause to compare the price of construction materials at the time of purchase with the price upon the completion of the contract.

1.3 Financing strategies

Securing liquidity is of very high, frequent, and vital importance. In the construction process, very highly advanced services are rendered that can only partially be covered by advance payments. Construction equipment, wages, construction materials, scaffolding, framework, pit lining supplies, external services and so forth are to be paid for (cf. Figure 1.6). Subsequently received down payments or final payments come at a later time: with respect to down payments, the what is received is based on the percentage of completion, and the final payment is due upon full completion of the project.

13) EFB StGl-319, decree of 04/2008 as well as decree of 23/03/2009 of BMVBS – extension of the federal building construction until December 31, 2010 of the material price escalator clause for steel.

14) HVA B-StB 03/09 - Manual for the award and performance of construction service in the road construction and bridge construction, hardback March 2009.

Present expenditure for:	Later receipts from:
• Construction equipment • Wages • Building materials • Scaffolding, framework and pit lining supplies • External services • Any other business	• Down payments • Final payments

Figure 1.6 Liquidity risks of construction companies¹⁵⁾

The typical seasonal development of receipts and expenditures for building construction and road construction companies are displayed in Figure 1.7. In spring, when the weather allows construction activity to start up again, expenditures grow rapidly as well because construction companies must begin advanced services of their pending projects. Receipt of payments lag behind, so strains of liquidity often occur through the fall months. Therefore, appropriate liquidity planning is necessary, as is presented in Chapter 2.1.7. In the last quarter of the year and the first quarter of the new year, received payments generally exceed expenditures. This is partially due to the fact that many construction projects are settled at the end of the year. This context, as well as a schematic representation of a model company's liquidity in a single year, are illustrated in Figure 1.7 and Figure 1.8. Naturally, this business model can vary in individual cases, for example, in specialist foundation engineering or finishing trades.

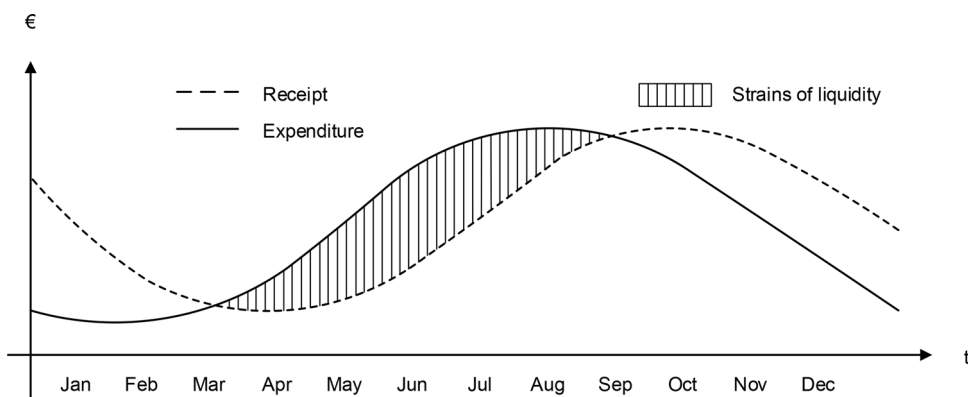


Figure 1.7 Typical seasonal flow of receipts and expenditures

¹⁵⁾ Jacob (2000 a), p. 53.

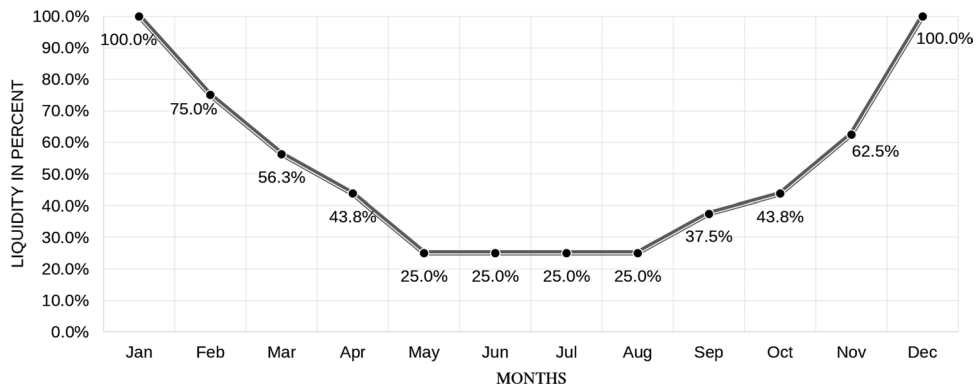


Figure 1.8 Schematic liquidity of a model construction company

In respect to the financing strategy, the bonds are of great importance. Here, the contract performance bond and warranty bond are worth mentioning. These can constitute an even greater volume than the total assets of a construction company. Therefore, bank bonds should be counted among the loans according to the German Credit Services Act. For this reason, and due to the equity regulations for banks according to Basel II and III, construction companies primarily acquire surety bonds.