# Construction Giant

## A competency-oriented board game for education and training in the construction industry

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# MANUAL FOR PARTICIPANT





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# 1. BASICS OF THE SIMULATION MODEL

Participants in this business game are moving within a triangle consisting of market, product and company. These three subsystems can be assigned to competencies, which are mandatory for the construction management (see fig. 1). The objectives of the individual subsystems can be derived from this association.

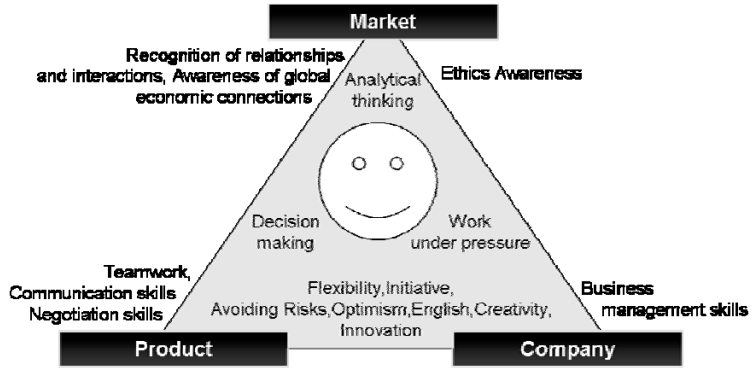


Figure 1: Competencies within the three dimensions of this business game

# 2. IMPLEMENTATION

The participants take control of an existing construction company. To become the construction giant at the end of the session, the company must be successful as long as possible. Second, as an overarching goal the joint construction of a city is defined. Thus, an individual and a common goal is determined.

## *2.1. EQUIPMENT AND DOCUMENTS*

This board game is equipped as mentioned in table 1.

Table 1: Equipment of the board game

| | | |
|---|---|---|
| 49 Hexagons<br>1 Quick Board<br>1 Cube (Numbers 1 to 6)<br>1 Cube (Numbers 1 to 3) | Simple project cards<br>Complex project cards<br>Project price list<br>Project event cards<br>Company event cards<br>Market event cards | For each participant:<br>1 pawn (in its own color)<br>15 houses (In the color of the pawn)<br>30 black tiles<br>20 blue tiles |





| | | |
|---|---|---|
| | Additional cards<br>Bonus cards<br>Small wooden cars for road construction projects | For the whole game:<br>100 red tiles |

The project cards are provided next to the board. The projects vary by the type of tender (client) as mentioned before. In one stack there are public and private tenders, in another stack there are only single tenders. Depending on the desired complexity, the different event cards, additional cards and bonus cards are also available next to the board: Each company receives at the beginning of the business game the following documents:

- A guide,
- A card with calculation bases,
- An individual company report regarding financial situation, resources and existing projects,
- A bidding card,
- A form for entering the calculation.

These documents will be handed to each participant in a sealed envelope. In order to train the demanded language skills, both the documents as well as the rest of the business game are in English.

## *2.2. RESOURCES AND CAPITAL*

The following resources are assigned to each company: Workers (black tiles), own devices (blue tiles). The amount of each resource is provided in the individual company report. Every participant should sort the partially used resources within the existing projects in a separate box. The remaining resources should be sorted in the lid of the box. Each participant will receive a pawn in an individual color and 15 houses of its corresponding color.

In addition, on the market available rental items (red tiles) will also be introduced. Depending on the choice of complexity there is limited or unlimited rental equipment in the market. Corresponding to the individual company situation each company receives capital as paper notes.

## *2.3. GAME MANAGEMENT*

Two participants take the game management. Their tasks are:

- Administration of the Bank,
- Check the offers with the project price list (usury, collusion etc.),

- Logging of tenders (bidders list),
- Holding of the joint venture contracts,
- Holding of additional cards (insurance policies, etc.).

The project price list is to be kept concealed (on the front lying). Depending on the number of participants, the tasks can be distributed among several participants.

### *2.4. VARIATIONS*

This business game is highly variable depending both on the target group as well as of the learning progress. This is implemented through nine possibilities of variation: Supply and demand, event cards, additional cards, rental equipment market, cooperation, cost estimation, time, experience and bonus cards.

**Supply and demand** can be represented by using different segmentations of the playing field and/or by pre-sorting the project cards. Because of this variation the participants have to monitor the market continuously. They have to respond to current trends and estimate future situations.

Participants must also respond to **specific events**. There are three event categories (E1, E2, E3), which can be independently included in the business game. They affect all three areas: **project** (E1), **company** (E2) and **market** (E3). An event of the market will affect all companies. Project and company events affect only the project/s or company of the participant who has drawn the card.

An **additional card** gives the company the opportunity to protect themselves against the consequences of events through insurances regarding personal injuries or equipment accidents. They can be purchased anytime during the business game and are valid for one round/ quarter, but not in the case that someone arrives on an E-field.

As already mentioned, the available **rental items** within the market can be limited. Limited means that only a maximum number of rental units will be available in the market (from zero to “infinite”).

As previously described, the **cost estimation** can be performed in two ways. In the business game there are two sets of project cards. One set describes the projects in a simple form (Project costs are given, only risk and





profit should be chosen.) and the other set describes the same projects more in detail. The simple form of calculation requires only a few project data. The complex calculation corresponds to the calculation as is common in the construction industry.

To simulate **work under pressure** the tendering can be done with or without a time limit by using an hourglass. Those who have not submitted their offer until the end of the time will be treated like losing bidders. They must pay in any case the bidding costs. The bidder who chose to make no explicit offer is exempt (corresponding entry in his bidding card necessary).

Depending on the selection of projects, companies have the opportunity to bring in their gained **experience** both in tendering and in the construction as follows:

- Experience in tendering: The participant has already won three tenders next to one another.
- Experience in the construction:

a) The participant has already completed two projects on a specific road.
b) The participant has already completed two projects of the same type next to one another.

For both the project costs for the next project (which can be also a joint-venture) will be reduced by five per cent, but only if the counted projects are on one's own responsibility and not within a joint-venture.

To remind the participant of the reduced project costs for the next round, he will get for one of the aforementioned cases a small square card (with a smiley upon it).

If required, **bonus cards** are mixed into the event cards. These cards include knowledge issues. The correct answer to a question will be rewarded with a monetary amount, which is set on the bonus card.

## 3. EXECUTION OF THE BUSINESS GAME

Each round corresponds to a quarter of a year. All companies start at the starting field. The one who rolled the highest number begins. Thus begins the first quarter. It is rolled in a clockwise direction. At the beginning, no

payments for existing projects are to make. All payments for the previous quarter are already done.

### 3.1. ACQUISITION OF PROJECTS

The acquisition of projects takes place in two ways: during the game process and to the beginning of a quarterly period.

If a participant arrives during the game process on a P-field (project-field), than he must draw a project card from the stack with the public and private tenders. With a group size of less than five each participant has to take even two project cards to ensure a sufficient number of projects. According to the different types of tender, the following consequences appear:

- **Public tender**: Completely open situation. All companies have the opportunity to bid.
- **Private tender**: Limited situation. Every second company has the opportunity to participate in the tender. But at least three! The dice will decide on four participants.

The **single tender** will appear only at the beginning of a quarterly period. Then, each participant gets an exclusive tender through drawing a card from the stack with the private tenders. This project is for the company that it has drawn. Only this can make an offer. All the tenders will be registered in the bidding card (always) and the calculation card (only if an offer has been submitted). If a company refuses to submit a tender for a project, then "no" (no offer) should be entered in the bidding card.

### 3.2. SUBMISSION PHASE

The bidding cards are given to the game management or another participant who can not or may not offer. This person performs the submission phase through three stages:

1. **Formally considerations**: Are all fields in the bidding card filled out?

The bidding card must fill out completely. If missing data are identified, the bidder shall be ineligible for submission. The bid costs are still due! This is also the case if the bidder should have entered only "no" and nothing else.

2. **Competition**: Was there competition in public or private tenders (at least 2 offers)?





If no competition has taken place the project will not be awarded. Expenditure because of bid preparation (bidding costs) must be paid by all bidders.

3. **Price**: Is there an excessive bid in private or single tenders (maximum amount exceeded regarding project price list)?

For each available private or single tender a maximum price is defined. This reflects the fact that private clients, in case of a too high price the project will not be awarded. Public authorities have to perform usually the requested project. Therefore, for such projects, no examination of the price is carried out.

Within this business game it is assumed that all bidders are qualified for the available projects. For this reason, an assessment of the bidder qualifications is not taken into account.

After approval, the project is awarded to the lowest bidder. This participant sets a house with the gable site on the appropriate field on the board (If the project is completed, the house is placed on the base side.). In the case of a road project, the participant sets one of the small wooden cars on the corresponding road. Such a project can affect significantly the end of the game. Furthermore, he writes the official reported costs of the project (from the project price list) in its calculation card. This value is the basis for the project expenditure, regardless of what the participant has calculated. The project starts in the next quarter. At least now, the participant has to plan his resources by sorting the required resources out form the lid (available) to the box (used). The first payment according to the expenditure plan of the project (available on the project card) must be done at the beginning of the next quarter.

In the event that multiple bidders have submitted the same offer amounts a renegotiation is performed with these bidders. In the bidders list a new line with the project number and a following "-N" (negotiation) has to be recorded. The renegotiation costs the parties further 10% of the offering expenses. The losing bidders have to pay that amount immediately after the final submission. The winning bidder pays at the end of the quarter.

### 3.3. RESOURCES AND JOINT VENTURES

Devices can be bought from the Bank or from competitors. They can also be sold in the same manner. The price has to be negotiated with the competitors in the business game. The Bank has his own fixed prices. Staff can only be obtained from the bank. It can also be dismissed. This involves firing costs which are not insignificant (this includes a social component within the

business game). Rental equipment and temporary staff from competitors are not allowed. For such a situation a joint venture contract should be chosen.

If according to the variation of the business game joint ventures can be formed following principles apply:

- Not more than two companies can be involved in a joint venture.
- The joint venture contract must be done before submitting the tender.
- In the contract, the deployed manpower and equipment for each party should be entered.
- The negotiated interests for each party should be fixed in the contract. These shares are treated for both the expenditure and revenue as well as for the offering expenses.
- The contract belongs to the bidder cards of the involved companies.
- In the bidding cards not the share offer price is entered, but the full bid price in each card.
- It is also necessary to include in each bidding card the name of the joining company.
- The joint venture is considered as one bidder.

The game management reviews the offer as mentioned in the submission phase. In addition, the joint venture contract is inspected regarding the required resources of the project. Are these resources are insufficient for the project; the offer falls out of the ranking. The bid costs are still due.

### 3.4. EVENTS

If a participant arrives during the game process on an E-field (event field), he throws - if more than one event category was included in the business game - with the second dice. The number rolled on the dice (1, 2 or 3) corresponds to an event category and therefore the number after the E (E1, E2, E3). If not all the event categories were included, the dice is rolled as long as a number corresponds to the existing event category. Following a corresponding event card is taken from the stack and the content is announced to the participants. After that, the card is usually mixed below in the appropriate stack.

Event cards, which are equipped with a black dot on it (E2-cards), remain until the next quarter by the participant that took this card. Such an event will influence the company for the rest of the quarter. That has also consequences regarding expenditure or other aspects. After the end of the quarter, they are mixed below in the appropriate stack. Event cards, which are equipped with a





black circle on it (E3-cards) remain visible to all next to the board. An event of this category will influence the market for this or more quarter.

### 3.5. END OF A QUARTER

The quarter ends if all participants have thrown once. Construction companies are tending to build first and get paid for it later. Because of this fact, the revenues will be determined for the last quarter according to the project cards or the list of the existing projects. These are paid by the bank (Basis of revenue is the bidding price.).

Also, the expenditure for the projects of the next quarter will be determined (Basis of expenditure is the cost out of the project cost list). In addition, spending on unused resources (in the box) should be calculated, because unused equipment or workers still produce costs within a company. All these expenses are paid to the bank. The resources out from completed projects are available for the coming quarter, now. Any consequences of event cards will also be charged at this time.

### 3.6. THE CASE OF INSOLVENCY

If a company is insolvent, two options are available: At least one competitor makes a loan to the bankrupt firm or the bank makes a loan. These alternatives must be set before the game. If a credit is awarded a credit agreement must be concluded between the parties. The contents of the agreement such amount of the loan, repayment and interest rate are negotiated. If none of these options is used, the following happens.

The ongoing projects of the insolvent company will be offered to the former second-place bidders. The bank offers these projects to them for the offer price of their own bid plus 5%. Unless they decline, the other bidders according to the ranking of the former submission result get the same offer. Projects, which no one wants, will go into the possession of the bank (Including the replacement of the houses on the board.).

### 3.7. END OF THE BUSINESS GAME SESSION

At the end, the final settlement has to be done. For each company, the following accounting principles are mandatory:

- Each completed project/ house (house stands on the base side): 2 points
- Each ongoing project/ house: (house stands on the gable side): 1 point

- A contractor has completed all projects / houses on the same street: 1 bonus point
- Projects/ houses of an entrepreneur are continuously connected with a road. What matters is the shortest connection, for instance the fewest number of roads between the projects. It is sufficient if the linking road is under construction: 1 bonus point for each field where at least one own project was started.
- A loan was needed: -1 point for each loan
- A loan has been repaid: 1 point for each loan

The participant with the highest score is the construction giant. At the same point scores, the following order should be applied:

1. The total number of workers in the company (social aspect),
2. the total number of devices in the company (tied-up capital) and
3. the available capital (free capital).

For the assessment of the group, the following accounting principles are mandatory:

- Each completed project/ house (house stands on the base side): 2 points
- Each ongoing project/ house: (house stands on the gable side): 1 point
- Each completed road construction project: 3 points
- Each ongoing road construction project: 2 points

The determined group score can be used with other simulation groups as an evaluation criterion, provided that it is the same scenario.





# 4. APPENDIX

## *4.1. Basis for calculations*

<u>Workers</u>
(Black Tiles)

| | | |
|---|---|---|
| Wages for Worker | 15.000 | Euro / Quarter each |
| Costs for recruitment | 1.000 | Euro once / Worker |
| Costs for dismissal | 45.000 | Euro once / Worker |

<u>Own equipment</u>
(Blue Tiles)

| | | |
|---|---|---|
| Own device in operation | 30.000 | Euro / Quarter (incl. machine operator) |
| Own device not in operation | 10.000 | Euro / Quarter (incl. machine operator) |
| Buy equipment | 180.000 | Euro (incl. machine operator) |
| Sell equipment | 90.000 | Euro (incl. machine operator) |

<u>Rental equipment</u>
(Red tiles)

| | | |
|---|---|---|
| Rent equipment | 30.000 | Euro / Quarter (incl. machine operator) |

Devices can also be sold/ bought in the market.
Then, the price is a matter of negotiation with the competitors in the game.
Equipment rental is not allowed from the competititors.
For such a situation a consortium contract is possible.

<u>Calculation</u>

Wage costs = (number of workers) x (Euro / quarter) x (duration of construction)
+ Material costs
+ Equipment costs = (number of devices) x (€ / quarter) x (duration of construction)
+ External Services
+ Site overhead (min. 3%) <= (material costs + labor costs) x site overhead [%]
+ bidding costs
---
= Production Costs (PC)
+ Rate for general business expenses (min. 6% from PC)
---
= Project Costs
+ risk and profit
---
= Bid Amount (net)