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STRATEGIC SIMULATION GAME: FURNITURE PRODUCTION

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1 Introduction

Congratulations! Reading these lines means you're about to play a simulation game from the environment of furniture industry, so you're going to have a lot of thinking, counting, but, mostly, fun. It is a simulation of the production company and its operation on the market. The simulation combines real-world elements with simulation options that are limited to maintaining clarity and simplicity of the game.

The company is formed and led by three students (team members) who work together for the best possible result (the highest possible share price of their company). Emphasis is placed on joint decision-making and strategic planning. Task distribution can be done based on mutual agreement of team members.

1.1 Simulation game objectives

1. Practice decision-making in a simulated business environment.
2. Apply knowledge and skills in the field of business management and relationships between individual business functions acquired in other courses studied (operations management, HR management, finance, accounting, marketing...).
3. The goal of the game itself is to achieve the highest possible share price of your company and to win the market in which the company operates.

The elements of the simulated company are:

- **Market research.** Short-term and long-term decisions on the quantity of desks and cabinets produced are made on the basis of a detailed market analysis (future market potential).
- **Sales.** Final products are offered in a competitive environment. Therefore, the product mix and price setting play an important role.
- **Planning and production.** It is possible to produce desks and cabinets. The production cycle is planned quarterly.
- **Supply.** Two types of raw materials are used in production: wood and metal.
- **Human resources management.** Within the framework of personnel policy, it is possible to manage recruitment and layoffs of employees, wages, training.
- **Finance.** The financial plan shall be drawn up in such a way as to cover all relevant costs.

2 Description of the simulation model

2.1 Simulation description

All companies are of the same type, making desks and cabinets.

Desks are easier to produce, production batches are higher, while cabinets are a special product and are more complicated, produced in smaller quantities.

Cooperation between individual companies or creation of cartels in any form is not made possible by not revealing the identity of competitors in the simulated market. Any attempts to form cartels are prohibited.

2.2 Market

All companies registered in the game will be assigned into markets. Individual markets are completely independent of each other. There are 5 companies in each market; four companies are controlled by the “live players”, and one of them is managed by an artificial intelligence. The tutor will distribute the companies so that there are no two companies from the same seminar in any market.

2.3 Gameplay Supervision

The course of the game is monitored by the instructor – the tutor. The tutor's instructions are binding for the simulation participants. The instructor also acts as an advisor in the field of simulation rules and its procedures.

2.4 Game Round

The game consists of individual quarters that represent the game rounds. Four consecutive quarters (four game rounds) make up one game year.

The game starts at the beginning of this year (year 1) and the economic results of each quarter Q1-Q3 are presented in the company's web interface in the section Reports. New managers (i.e. you) start running the company fully from the beginning of the following year (year 2). However, you take over the business at the end of Q4 of the year 1 and at this time you can only request market research for the following period.

The decision is made via the web interface. There are certain dates for each round that are listed on the game's website. Each term ends at 11.59:59 p.m. The home address of the simulation game is strategicgame.mendelu.cz. If the decision is not made within the set deadline, the company remains idle (does not produce, does not sell), which has a strong negative impact on the share price, since the company has to pay the fixed costs (wages, maintenance of machines etc.) and the competition does not sleep.

You will get the results of the decision shortly after the end of the quarter (always ca 15 minutes after midnight). Quarterly data is available on the simulation website, and the immediately following term is listed in the company's web interface (bottom left).

The details of the organization of the game are explained during the first seminar.

2.5 Introduction to the game, company development

You have just been hired or promoted to management of a company. You are in the last quarter of the first year of the company's existence (Q4 of the year 1) and you take over the responsibility for the company's future. An overview of the development within the previous three quarters is given

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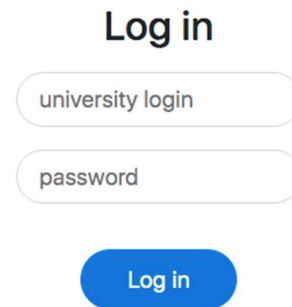
in the company's web interface in the Reports section. These results represent a starting position that is the same for all companies in the given market.

At the moment, nothing is known about the market situation – this is the only area you have the opportunity to influence when you start your business in Q4 of the year 1. Therefore, you can conduct a market research and obtain information on sales possibilities (market potential at a certain price) and raw materials prices – for details, see 3.2 Market research

In the following decision-making period (Q1 of the year 2 – i.e. the first quarter of the second year of simulation), you will already be fully involved in running the company within the rules defined here.

2.5 Registration

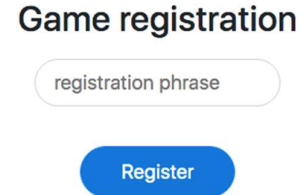
To register for the game, you must first log in so that the system knows who is registering. You log in to the game with the same access information you use to log in to the UIS.



The login form features a title "Log in" in blue. Below the title are two input fields: "university login" and "password", both in light gray. At the bottom of the form is a blue "Log in" button.

Figure 1: Login to the game

The first time you log in to the game, you need to enter a registration phrase that will allow you to be assigned to the right game (multiple games can take place at the same time). For 2022, the phrase is: "**simulation2022**".



The registration form has a title "Game registration" in blue. It contains one input field labeled "registration phrase" in light gray. Below the input field is a blue "Register" button.

Figure 2: Registration phrase

In the next step, you have the option to register a new company or join an existing one. Once you have done this, you have the option to make changes by the specified deadline. If you don't want to make changes, wait for the deadline to expire. Then the instructor assigns registered companies to the markets.

3 Market research and sales

3.1 Introduction

Market research and sales are closely linked. Market research includes:

- market demand survey,
- research on the raw materials prices,
- a survey of competitors' behaviour.

As part of the sales, the company determines by its decision:

- the number of desks and cabinets for sale,
- the sales price.

3.2 Market research

The simulation allows you to conduct a survey of the market situation. Each standard market information is provided at a predetermined price.

The standard market information is:

1. Market potential for desks and/or cabinets (up to 4 quarters in advance) at a certain price of the product.
2. Raw material prices (up to 4 quarters in advance).
3. Competitors' prices (for the previous quarter).
4. Sales of competitors (for the previous quarter).

Exploring market potentials

The market potential identified for a given quarter is the size of demand for desks or cabinets at the specified price in the market in which the company operates. In other words, it is the number of pieces of the product in question that the *whole* market (not a single company!) is able to absorb at a given price level. Hypothetically, assuming that the offer of all companies will be identical, companies will share the market evenly. Keep in mind, however, that even in simulated reality, there are differences and competition.

Market potential research can be obtained for up to 4 consecutive quarters – i.e. up to the round $n + 4$, where n is the current round. The possibilities of exploring the potential of the market depend on the current round:

- a) In the last quarter of the fiscal year, it is possible to obtain a larger amount of information (issuing statistical yearbooks, etc.) and it is therefore possible to conduct a market survey for all quarters of the upcoming year at a given price (or only for arbitrarily selected quarters of interest to players).
- b) In all other quarters of the fiscal year, market research opportunities are limited. It is possible to examine the potential of the market for only one of the following four quarters.

The price of the information is CZK 25,000 per product and quarter. However, the marketing agency decided to grant a quantity discount. For details on this promotion, visit the simulation site strategicgame.mendelu.cz.

Payment is made immediately in the simulation period of that particular round.

Example: A decision is to be made for round 7 (Q3 2022) and the team wants to get information about the market potential for both desks and cabinets for the round 11 (Q3 2013) at a sales price of CZK 1200, resp. 2400 per unit. The form shall be completed as follows:

Order of market survey of the product Desk

Target quarter:
 do not order Q4 2022 Q1 2023 Q2 2023 Q3 2023

Target price:
 CZK

Price of survey: 25 000 CZK

Latest change: Janis Student (8. 9. 2021 12:49:57)

Order of market survey of the product Cabinet

Target quarter:
 do not order Q4 2022 Q1 2023 Q2 2023 Q3 2023

Target price:
 CZK

Price of survey: 22 500 CZK

Latest change: Janis Student (8. 9. 2021 12:50:05)

Figure 3: Order to explore the market potential of desks at a price of CZK 1200 and cabinets at a price of 2400 per piece

In this case, the information obtained will look like this:

Table 1: Market survey results

Market survey of Desks			Market survey of Cabinets		
Quarter	Price	Market potential	Quarter	Price	Market potential
Q3 2023	1 200	30 954	Q3 2023	2 400	11 984

Example: When starting a simulation in round 4 (Q4 year 1, i.e. the last quarter of the fiscal year), the team wants to get information about the market potential for desks for all 4 subsequent quarters (rounds 5–8), but only requires information about the second half of the next year (rounds 7 and 8) for cabinets. For the purposes of exploring the potential for desks, they chose the price of CZK 1200, for cabinets CZK 2400. The form must be completed as follows:

Order of market survey of the product Desk

Target quarter:
 Q1 2022 Q2 2022 Q3 2022 Q4 2022

Target price:
 CZK

Price of survey: 85 000 CZK

Latest change: Janis Student (28. 8. 2021 18:40:50)

Figure 4: Order to explore the market potential of desks at a price of CZK 1200 per piece

Order of market survey of the product Cabinet

Target quarter:

Q1 2022
 Q2 2022
 Q3 2022
 Q4 2022

Target price:

CZK

Price of survey: 27 500 CZK

Latest change: Janis Student (28. 8. 2021 18:40:52)

Figure 5: Order to explore the market potential of cabinets at a price of CZK 2400 per piece

In this case, the information obtained will look like this:

Table 2: Result of the survey of market potential of desks at the price of CZK 1200 per piece

Market survey of Desks		
Quarter	Price	Market potential
Q1 2022	1 200	19 858
Q2 2022	1 200	21 186
Q3 2022	1 200	22 031
Q4 2022	1 200	21 013

Table 3: Result of the survey of market potential of cabinets at the price of CZK 2400 per piece

Market survey of Cabinets		
Quarter	Price	Market potential
Q3 2022	2 400	9 389
Q4 2022	2 400	9 643

This is an entry into the simulation game at the end of Q4 of the year 1, in which market information can only be requested and no other activities are carried out (everything else was already done by the previous management).

Raw materials prices

Information on the prices of the two main raw materials can be obtained up to four quarters in advance [quarter (n+1), (n+2), (n+3) and (n+4)] as a part of any decision.

Price: CZK 10,000 per quarter. A quantity discount is also granted for these surveys.

Procedure: just tick the box next to the relevant quarter.

Example: You are making decisions for Round 8, and the team is requesting information about raw material prices in rounds 11 and 12, i.e. (n+3) and (n+4). The form selects the check box next to the relevant rounds.

Order of raw material price survey

Q1 2022
 Q2 2022
 Q3 2022
 Q4 2022

Total price of survey: 19 000 CZK

Latest change: Janis Student (28. 8. 2021 18:41:07)

Figure 6: Request of raw material prices for Q1 and Q2 (9th and 10th round of simulation)

In this case, the information you requested will look like this:

Wood - price survey	Metal - price survey
Q1 2022 22,32	Q1 2022 16,76
Q2 2022 19,32	Q2 2022 16,84

Table 4: Raw material price survey result for Q1 and Q2 (9th and 10th round of simulation)

Competitors' prices and sales volumes

As a part of the simulation game, you can track the prices at which competitors sold their desks and cabinets in the last quarter, as well as the number of products they sold. The information is therefore required in advance (as a part of the decision of the given round) but provided with a delay (within the results received after this round). This is logical, because competitors are live players, and no one knows in advance what they will decide.

Price: CZK 5,000 (prices) + CZK 20,000 (sales volumes)

Procedure: just tick the appropriate boxes

3.3 Sales

As mentioned earlier, the sales cover all activities related to the offer and sales of final products. A decision should be taken on the quantity and price of the products offered, taking into account the expected demand and expected practices of competitors on the market. This is one of the most important aspects of the whole game. The share price of a company that can hit the market potential (i.e. does not offer too much or too little) will boost!

Sales volume is therefore affected by the following factors:

- market absorption (market potential),
- the quantities and prices of the products offered by competitors.

3.3.1 Pricing policy

Correct pricing is the most important factor for gaining and maintaining a market position. The influence of competition is also very important.

The sales price of the products offered should be fixed in each round. The price must be expressed in CZK per piece of the final product. The price must be within the specified range:

Table 5: Theoretical range of product prices

Sales prices (CZK)		
Product	minimal	maximal
DESKS	1 100	1 300
CABINETS	2 000	2 800

3.3.2 Sales

ATTENTION! Only products that were in stock at the end of the previous quarter, i.e. were produced or not sold in previous quarters, can be sold in the recent quarter. In other words, it is not possible to sell products that are being produced in the recent quarter. These can only be sold in the following quarter(s).

Customers of final products pay immediately – no delay in payments or insolvency is considered. Neither organization of physical collection of goods from your company is considered – the products are "released from stock" and the customer of the final products is thus de facto burdened with this part of logistics.

The marketing department does not have the opportunity to actively promote products and brand.

3.3.3 Out-of-stock costs

If a company is unable to meet the demand for products, it loses goodwill. Such a situation occurs when the market would be able to absorb more products at a given price than the company supplied to the market. In the simulation, the loss of reputation translates into the out-of-stock costs. For desks, these costs are CZK 25 for one non-delivered piece, for cabinets it's CZK 50.

Example: If, for example, in a certain quarter the market potential of desks at a price of CZK 1,190 per piece is 3,000 pieces and the company will offer only 2,800 pieces at this price, this is a mis-estimated demand, and it will cost the company $CZK\ 200 \times 25 = CZK\ 5,000$.

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However, if the company offers the whole product inventory on the market at the maximum price, the out-of-stock costs do not apply.

3.4 Marketing and sales organisation

The company employs permanent employees for the marketing and sales function. The cost of this department is CZK 150,000 per quarter. However, the simulation does not address the activities of this department.

4 PRODUCTION

4.1 Introduction

Production of both types of furniture takes place simultaneously. Raw materials entering production are processed into final products – desks and cabinets. Both products are manufactured using machines. The machines are universal, both products can be produced on them (even at the same time).

In addition to machines, it is also necessary to have enough raw materials and manpower to produce. The quantities required are described in this chapter. For more information, see Chapters 5 (Supply) and 6 (Human Resources Management).

Finished products may not be sold until the quarter following their manufacture, at the earliest.

The simulation assumes a standard and stable quality of the products (the company cannot influence it in any way).

Production schedule

Production takes place in three shifts (morning, afternoon and night). The occupation of shifts by workers depends on the amount of furniture produced (see Table 6). Each shift can work a maximum of 500 hours per quarter. The maximum capacity of the machine is therefore 1,500 hours per quarter.

The same production facility may produce desks and cabinets during the quarter if the schedule does not exceed the above limit. Production must be planned in 250 multiples of the machine time for each individual machine.

The time demands of individual products vary. The number of desks and cabinets produced by one production facility and the need for workers are shown in Table 6.

Table 6: Relationship between machine time and quantity produced

Machine time [hours]	DESKS		CABINETS	
	production [pcs]	needed workers	production [pcs]	needed workers
250	125	1	25	2
500	400	2	75	4
750	675	3	125	6
1 000	950	4	200	8
1 250	1 225	5	275	10
1 500	1 500	6	400	12

Note: When using one machine for the production of desks and cabinets in combination, it is necessary to count with the stated number of workers – if you produce desks for 1000 hours and cabinets for 500 hours, you need 4+4, i.e. a total of 8 workers (production does not take place only on the given machine and the required work outside the machine is included in the specified working capacity).

Example: The company has three machines. They want to fully utilize all of them. One is intended to produce only desks, the other only cabinets, and the use of the third one is split in halves. Production will be “ordered” as shown in Figure 8.

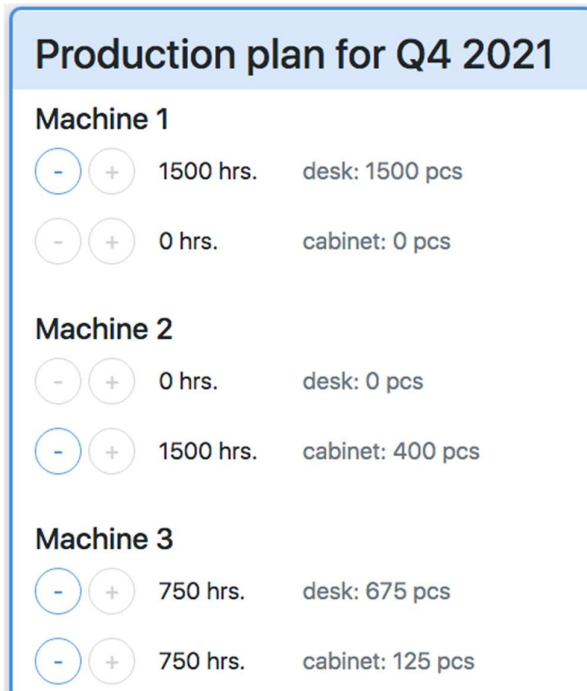


Figure 7: Production specification for three machines

4.3 Raw materials

Wood and metal are needed to produce desks and cabinets. The quantities required are given in Table 7.

Table 7: Raw materials needed to produce both products

Product Raw material	DESKS	CABINETS
wood [kg]	12	24
metal [kg]	8	16

4.4 Increasing and reducing production capacity

Machines can be purchased and sold arbitrarily, but the maximum number is 10 machines – this is due to the size of the production hall. The possibilities of increasing this capacity are not considered.

The purchase price of a new machine is CZK 600,000. This amount is paid in the round, in which the machine is ordered. The machines are delivered immediately and are put into operation in the round following the round of ordering (they must be installed and adjusted).

Machines can also be sold. The sale price is CZK 300,000. The machines sold can be fully used during the round in which it is decided to sell them.

4.5 Production cutbacks

Failure to fulfil the production plan may occur in the case of:

- a) shortage of raw materials,
- b) labour shortages.

If, for some reason, it is not possible to keep the production plan, the capacity is automatically adapted to the available resources. Production capacity reduction is carried out in steps of 250 hours. First, 250 hours are deducted from the production of cabinets, then 250 hours from the production of desks. This procedure is repeated until the balance is reached.

4.6. Storage of products

Final products produced during the quarter are temporarily stored before they can be sold in the following quarter. The storage costs of any product are CZK 10 per unit per quarter.

Products do not lose value through long-term storage.

From the point of view of warehouse management, the FIFO method is applied. It applies to raw materials as well as finished products. This affects only cost calculation in the simulation.

4.7 Production costs

Quarterly fixed production costs (including reinvestments) are CZK 150,000 per production facility – regardless of planned production.

5 SUPPLY

5.1 Introduction

In the manufacture of desks and cabinets, two types of raw materials are used: wood and metal. The raw materials do not lose value when stored.

5.2 Supply of raw materials

Raw materials are supplied and paid in the round in which they were ordered. The quantity delivered shall be given in kilograms.

The time delay between the order and the delivery of raw materials is negligible in this model, the supply operates on the JIT principle. Raw materials are delivered and received immediately. Thus, raw materials can be ordered and used in production in the same quarter. Logistics cannot be influenced (e.g. by selecting suppliers).

Example: The company intends to purchase 50,000 kg of wood and 25,000 kg of metal. The purchase is made by filling out the relevant forms according to Figure 9. The form automatically calculates the purchase price as well as relevant quantity discount. In addition, for clarity, it also shows the current stock level.

Material	Volume (kg)	Inventory (kg)	Price per kg (CZK)	Discount (CZK)	Total purchase price (CZK)
Wood	50000	1 500	26,1	26 100	1 278 900
Metal	25000	31 300	12,08	0	302 000

Figure 8: Purchase of raw materials

5.3 Quantity discounts

In the case of the purchase of at least 50,000 kg of one type of raw material in one round, the supplier shall grant a discount of 2% of the purchase price (see the Fig. 9).

The discount is granted immediately and deducted from the price of the purchased raw materials.

5.4 Raw material warehouse capacity

The capacity of the raw material warehouse is sufficient. Raw materials can be used for production already in the round in which they were ordered (or at any time later).

Storage costs are calculated at the end of the round on the basis of the final stock of raw materials and amount to CZK 0.50 per kilogram, regardless of the type of raw material.

6 Human resources management

6.1 Introduction

The task of the company management is to implement a well-thought-out employment policy, which is periodically updated through collective bargaining. This means that all employees enjoy the same benefits (wage level, training).

The management of the company decides on:

- a) wage index (see 6.2),
- b) training (see 6.3),
- c) recruitment and dismissal (see 6.4).

The quality of personnel policy is reflected in the personnel index (see 6.5). The level of the personnel index reflects the level of employee satisfaction.

6.2 Wage level and wage index

Workers in this sector can work a maximum of 500 hours per quarter (40 hours per week). Overtime work is not possible.

At the beginning of the simulation (at the moment when you take over the management of the company), the company already employs 30 people. Each worker's quarterly salary of CZK 48,000 is treated as a 100 (percent) wage index. The basic salary includes social security and health insurance contributions.

The wage index must not be lower than 90 and the upper limit is set at 200.

The new wage index is calculated as a change to the wage at the beginning of the simulation, not to the previous round!¹

Example: If you decide to increase wages by 4%, set the wage index to 104. If you want to keep this level of wages afterwards, you don't have to do anything at all. The system will remember 104. If you want to regularly increase wages by 4% compared to the previous quarter, you need to set the wage index gradually to 108, 112, 116, 120 etc. in the following quarters. Entering 100 means returning to the original wage level at the beginning of the simulation.

6.3 Education

All activities aimed at increasing the qualifications of employees are included under the training. No training took place during the first four quarters.

The management of the company can decide whether or not to increase the qualification. Training has a positive impact on the personnel index. Neglecting training has a negative effect. Table 9 provides further information on the impact of training on the personnel index.

Training costs increase labour costs by 5% – always calculated from the current wage level.

¹ If you are unsure of how to increase wages and how to set the wage index, use the following procedure: divide the wage you want to pay your employees by the wage that is listed as the basic x 100 – that's the desired wage index value.

6.4 Recruitment and layoffs

New employees may be recruited every quarter. They are included in the work process in the following quarter (after training etc.), but they already receive their wages during the period of admission.

The company can have up to 120 employees.

If the personnel index in the recruitment quarter is below the average of all companies on the given market, there is an additional cost of CZK 5,000 per employee accepted. (For example, if a company's personnel index after Q7 ends below the market average, Q8 has additional costs for recruits.)

Layoffs can provoke a backlash from employees and consequently negatively affect the level of the personnel index.

Employees to be laid-off remain active in production until the end of the quarter in which the layoff was decided (notice period runs) and in this quarter they receive their wages for the following quarter too, when they are no longer physically in the company (severance pay).

Example: If you decide to layoff 4 employees in the 7th round of the simulation (Q3 2nd year), you can still count on them for production in this round and you will pay double of their wages including the severance pay. You can't count on them in the next quarter (Round 8).

6.5 Personnel Index

The personnel index is calculated every quarter as an evaluation criterion of the level of employment relationships. The personnel index level is affected with five variables. The low level of the personnel index can cause unrest, lower labour use and additional recruitment costs. Table 8 lists the factors affecting the level of the personnel index.

A personnel index of less than 110 causes absences, which can lead to a decrease in production. If the number of employees after absences is not in whole numbers, rounding down is performed.

Table 8: Factors affecting the personnel index

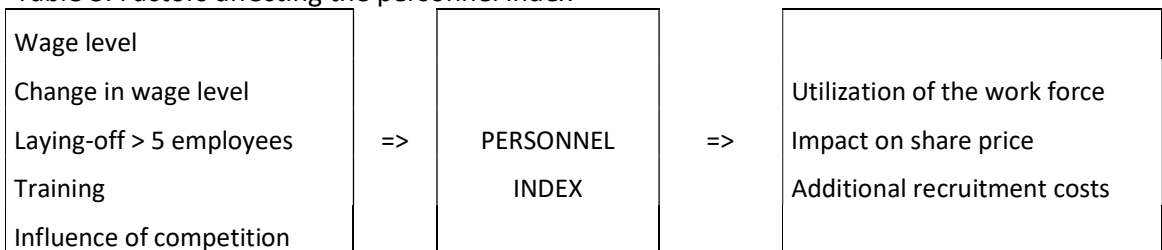


Table 9 shows how individual variables (level of wages, (non)provision of training, influence of competitors etc.) affect the personnel index.

Table 9: Influence of various factors on the personnel index

Determinant	Influence
Wage index	The starting point for calculating the personnel index is the currently set level of the wage index.
Change in the wage index	In addition, the wage index affects the personnel index to the extent that the wage index changes compared to the previous quarter.
Laying-off employees	The layoff of more than five employees in one quarter cause the personnel index to fall by 10 points.

Training	Support of training has a positive impact on the personnel index: Q_{n-1} Q_n Influence on PI yes yes +10 no yes +5 no no 0 yes no -5
Influence of competitors	If the company's personnel index is below the market average, 5 points are deducted.

Table 10 shows how the personnel index will evolve with various changes in the wage index. If employees receive a raise, they will be happy, which will be reflected in the given quarter by doubling the personnel index.

Table 10: Effect of the Wage Index on the Personnel Index

Quarter	Wage index	Change in the wage index	Personnel index
0	100		
1	100	0	100
2	90	-10	80
3	90	0	90
4	100	+10	110
5	105	+5	110

Table 11 shows the consequences of the resulting personnel index on the absence of staff.

Table 11: Impact of the Personnel Index on Staff Absence

Personnel index	$PI < 90$	$90 \leq PI < 100$	$100 \leq PI < 110$	$PI \geq 110$
Absence [%]	25	15	5	0

7 Finance

7.1 Introduction

The financial department of the company has two main tasks: financial planning and reporting.

At the beginning of the simulation, all assets, including buildings, machinery and ordinary assets, are financed from own capital resources. Financing of future activities may be credited. The Bank provides loans for investments and automatically grants an extended credit in the event of temporary insolvency.

All sources of funding are described below.

7.2 Equity as a source of financing

At the end of each quarter, standard financial statements are processed, which you can find in the Reports section.

Changes in equity can be achieved either by accumulating profit (in a positive sense) or by writing off losses (in a negative sense). New share emissions are not possible.

The results of each quarter also include the current share-prices of the company and its competitors.

7.3 External sources

External sources are provided by the bank in the form of an investment credit, based on a company requirement.

Credits are mainly aiming to finance long-term investments. A company may apply for a credit at any time during the current quarter, without a time limit. If the company is creditworthy (not having an extended credit), the loan will be automatically approved. There is no limit to the number of loans or their amount.

If the company received an extended credit in the previous quarter (see 7.4), the situation is more complex. In this case, it is necessary to write a request to the bank, which must contain a justification supported by calculations – what actually is the aiming of the credit, and what results the company expects. (The request is sent via the simulation web.) **Watch out! If the company got the extended credit, the application for an investment credit has to be submitted no later than 48 hours before the end of the quarter in order to enable the bank to approve it!**

The interest rate is 3 % per quarter. The standard loan period is 6 years (24 quarters). The agreed loans are already provided in the round in which they were requested (or approved). Interest payments and loan repayments are automatic.

Repayments start to take place one year after the loan is granted (in the amount of one twentieth of the total loan per quarter), interest starts to be paid immediately.

The investment credit can also be repaid or partly repaid at any time, without any penalties.

7.4 Extended credit and liquidity

In case of sudden liquidity problems, the bank provides an extended credit for the period of one quarter, in the amount rounded up to the nearest CZK 10,000. The interest rate is 10% per quarter and the interest is paid together with the credit repayment.

The extended credit is automatically repaid in the following round, even if it's necessary to provide another extended credit.

Two consecutive extended credits lead to the bankruptcy of the company (see Chapter 7.5).

7.5 Bankruptcy

If a company has to be given the extended credit twice in a row, it is technically considered a bankruptcy. The company can continue its standard activities. However, bankruptcy has a significant negative impact on the overall assessment and credibility of a company that is no longer able to apply for an investment loan.

7.6 Taxes

Operating profit decreased with interests and extraordinary expenses is taxed at the rate of 40%.

Taxes enter costs at the end of the fiscal year but are paid (become expenses) only in the quarter following the end of the fiscal year (in rounds 5, 9, 13, etc.).

Extraordinary revenues are not taxed.

Compensation for losses is only possible within a given year. This means that it is not possible to reduce the tax burden in the following year with a loss of the previous year.

In the first quarter of each year, taxes on profits for the previous year must be paid. Count on it in your cash flow!

8 RESULTS

8.1 Introduction

The results are presented to teams in several reports within quarterly reports, as well as through cumulative annual reports.

This chapter provides more information about these reports.

8.2 Principles of bookkeeping

To compile a profit and loss account (quarterly results), the cost of the products sold is deducted from sales. The costs of the products sold consist of:

- the cost of purchasing raw materials,
- change in raw material stocks (-/+),
- production costs (production equipment costs and labour costs),
- change in stocks of final products (-/+).

If raw materials are purchased into inventory because of a favourable price, this translates into an increase in expenses (not costs!) in a given quarter. Expenditure on the purchase of raw materials is included in the costs only when the products are sold. In contrast, in the next quarter, the company can draw raw materials purely from stocks, and therefore the cost of the products sold will be higher (on the contrary, the expenses will be zero).

For calculation of more accurate quarterly results, corrections are made with regard to the quantity of material bought and the quantity consumed from stocks. This correction is called a change of stock levels. In the case of drawing raw materials from stocks, the gross profit shall decrease, if the quantity purchased exceeds the requirements for the production of the products sold, the gross profit shall be increased with the corresponding amount.

The same applies to stocks of finished products. If products are produced in stock (you are selling less than you produce), the costs of products sold are corrected as they cannot be reported in full (gross profit will increase).

The economic basis for this calculation is that production costs must be reported in the quarter in which the products are sold. Revenues and costs have to be time consistent.

The correction of the stored raw materials and final products is made in order to correctly project expenses into the relevant costs and incomes (sales) into revenues.

When calculating costs, keep in mind that the FIFO method is applied. This means that if you bought cheap ingredients at the beginning of the game and more expensive at the next stage of the game, the ones consumed (and transferred to the costs) will be the cheap ones first.

Gross profit margin consists of sales from which the cost of the products sold is deducted. Operating result (profit or loss on operational activities before tax) is gross profit margin less indirect costs – market surveys, out-of-stock costs, storage costs and marketing department costs. Net profit from operating activities is operating profit less interest and taxes. After calculating extraordinary incomes and expenses, the total net profit is calculated.

Inventory valuation

In the balance sheet, both raw materials and final products are valued at fixed prices. Fixed prices are shown in Table 12. The change in stocks is also appreciated in fixed prices.

Table 12: Fixed prices for the valuation of stocks and products

RAW MATERIALS [CZK*kg ⁻¹]		PRODUCTS [CZK*ks ⁻¹]	
wood	metal	desks	cabinets
24	15	1 200	2 400

Valuation of fixed assets

Fixed assets are shown in the balance sheet in the same amount (CZK 3,000,000 for buildings and CZK 600,000 per machine) and depreciation is not considered.

8.3 Periodic reports

At the end of each round, teams receive the following reports:

- financial and production data for the previous quarter,
- annual report: data in time series (for previous quarters of the given year),
- requested market information.

Operating results

All operating results are included in the reports at the end of each quarter. This concerns data on supply and demand, sales, production, stocks of raw materials and final products. The quarterly report also includes information about the personnel index.

The historical report provides data on the utilization of production capacities, the number of available employees and data on cumulative sales. This report also includes identification of the possible cause of production cutbacks.

Financial results

Quarterly reports include profit and loss account, balance sheet, cash flow, current share price and labour costs. The historical report also lists changes in volume and the current state of use of external sources of finance.

9 EVALUATION

9.1 Introduction

During the game, teams are kept informed of the latest results. At the end of each quarter, a competitive score is announced in the form of the share prices of particular companies on the market.

This competitive score is influenced with a number of variables. Some management aspects are evaluated according to absolute criteria (standards), relative criteria are used to evaluate other factors (comparing results over time or between companies).

9.2 Evaluation criteria

The following criteria are used:

1. Market research – whether teams required sufficient adequate information to support decision-making (absolute criterion).
2. Pricing and supply – the “match” of supply and demand (absolute criterion) is evaluated.
3. Profitability:
 - (a) profit volume — the value of the profit and its evolution over time (relative criterion),
 - (b) comparison with competitors (relative criterion).
4. financing:
 - (a) the necessity to be given an extended credit and its amount (absolute criterion),
 - (b) volume of assets and their evolution over time (relative criterion).
5. Human resources – assessment of the quality of personnel policy through appropriate use of human resources, reasonable value of personnel index and compared to competition (relative criterion).

9.3 Team ratings

Based on the above criteria, teams receive a competitive score at the end of each quarter in the form of their company's share price. The share price is the weighted average of the evaluation criteria above.

The main function of the share price is to indicate the success of individual teams (companies). According to the value of the share in the last round of the simulation (i.e. the value of the share, which reflects the performance of the company *during the entire simulation period*), the ranking of companies on the given market is formed, taking into account the price of the share rounded to the whole CZK.

The algorithm is as follows:

- a) Companies rank ordered by the share price from the highest to the lowest. Each company is then assigned points so that the last company on the market has 4 points, the first has 20 points.
- b) We apply “safety net” if it is more advantageous for the company. We take a look at the company's share price. If the company's share price is in the interval of $\langle 70;79 \rangle$, the company gets 10 points even if it has less points from a). If it has more than that based on a), this does not apply. If a company has a share price of at least CZK 80, it will get 15 points even if it has fewer points from a). If it has more than that based on a), this does not apply.

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- c) If two companies have the same share price after rounding to the whole CZK, they will be in the same place (i.e. they will get the same number of points) and the next (following) position is skipped, e.g.: 1st, 1st, 3rd, 4th, 5th (we have two first places, second place is left out).

10 Game security and optimization

The game has a responsive design. This means that you can play it on a device with a screen of any size. It can be a large desktop monitor, tablet or a phone.

The game includes multi-level security against hacking and hacking attempts. All steps in the simulation are logged and traceable. Some logs are available for users.

The game contains hundreds of automatic tests, where the result of one test must match the result of the other test, so any hacking attempt (changing values outside of regular processes) will be immediately detected and the system will notify the game administrator. Attempted hacking is considered a serious disciplinary offense that leads to the termination of the company's participation with zero points for the game and a proposal to initiate disciplinary proceedings for all its members.

The simulation interface shows each player the log (name and time) of the team member who made the last change to anything, as well as the last login, which you can see in your personal player menu (in the upper right corner). If you're in doubt about someone logging in under your account and making any changes, check your last sign-in date.

The game is well secured against external attack, and the weakest link represent the players themselves – that is, you.

Please follow two fundamental rules:

1. **Never** log in to the game from other people's computers (in cafes etc.). If this is really inevitable, always open the game in an anonymous window and never allow the browser to remember your login details. The same security measures apply when you log in from shared computers in classrooms or study classrooms. Accessing simulation from shared computers is by far the riskiest behaviour in terms of game security.
2. **Never** send links to documents and simulation game pages (your company interface) publicly.

11 Declaration on processing personal data

The simulation game uses players' access data to the UIS. These access data are used exclusively for two purposes:

1. Player authentication.
2. Downloading a player's photo to display it in the game menu (only the player will see it).

Access data is securely stored. They will not be transferred to third parties and will be deleted at the end of the game (or the end of the semester).

By registering for the game, the player confirms that (s)he understands these terms and conditions and agrees to them.

12 Acknowledgements

The simulation game in its current form is the result of a long evolution. Pavel Žufan introduced the game at the FBE in about 2000.

In the early years, there was no web interface. Decisions were submitted in a paper form and were transcribed into Excel manually. In 2002, Jan Jakus, a student of computer science, created the first web interface of the game, which was used until about 2009. That year, there was another milestone in the realization of the game, when another student of the computer science field, Petr Hanák, modified the web interface into a form that was both more user-friendly and, on the other hand, allowed partial control of sent decisions focused on typos and formal errors in the decision-making.

Between 2017 and 2019, there was a revolutionary change initiated and managed by Vít Janiš. Till that time manual game was redesigned into a fully automatic system. Till 2018, all results were calculated manually in Excel by Pavel Žufan, which led not only to high labour demands, but also some error rate.

In the fall of 2019, the new version of the game with a clear web interface started to run for the first time. From that moment on, all calculations are performed by automatic algorithms.

Since 2021, the game at FBE has been played exclusively in English, the Czech version is used by the Faculty of Horticulture.

The simulation game consists of 517 files, 47,056 lines of code and 187 automatic tests, which the dual-core machine calculates for about 26 minutes. One game takes ca 250,000 calculations.

The simulation game has been prepared for you by:

Bc. Vít Janiš, BA (Hons), MSc, Ph.D. – development management

Ing. Ivo Pisařovic, Ph.D. – development: frontend + backend

Ing. Mikuláš Muroň – development: backend + AI

Ing. David Procházka, Ph.D. – graphics, design

Assoc. Prof. Pavel Žufan, Ph.D. – expert advice