

Decision-making instructions for Cesim Global Challenge™



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Table of Contents

HOME PAGE	3
1. MARKET CONDITIONS	4
2. DEMAND	5
DEMAND, TOTAL MARKET AND MARKET SHARE	6
3. PRODUCTION	7
PRODUCTION COSTS	8
4. INVESTMENTS	9
5. LOGISTICS	10
6. MARKETING	11
7. RESEARCH AND DEVELOPMENT	12
8. FINANCE	13
BUDGETS	14

Decision-making instructions

It is useful to print this document before you start working on your decisions. You should have this at hand when you start going through the decision-making tool

Home page

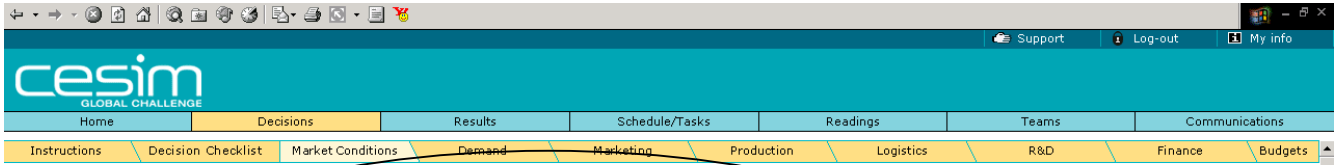
The screenshot shows the CESIM Global Challenge Home page. The page has a teal header with the CESIM logo and navigation tabs: Home, Decisions, Results, Schedule/Tasks, Readings, Teams, and Communications. The main content area is divided into several sections:

- Current Time:** Shows 'Your time: 2002-11-04 14:49' and 'System time: 2002-11-04 14:10'. A note below states 'Times are shown on the lower status bar of your browser.'
- Your Team Information:** Displays 'Course: [redacted], Group: Group1, Team: Green'. It lists 'Decision-making' details: 'Starts: 2002-11-04 14:05' and 'Ends: 2002-11-18 21:05'. The instructor is 'Veijo Kyösti'. A list of team members is shown with checkboxes: '1. Se [redacted]', '2. Ju [redacted]', '3. Ve [redacted]', and '4. Ar [redacted]'. An 'E-mail' button is also present.
- Closest Deadline 2002-11-08 21:05:** Features a 'Deadline for Practice Round' with 'Time remaining: 4 d 6 h 15 min' and 'Deadline by system time: 2002-11-08 20:26'.
- Tasks:** A list of three instructions: '1. Wait until your professor finalizes your group structure.', '2. After the deadline check whether your professor has not moved you or your team members to another team, group or course.', and '3. Just after the deadline go into Decisions page and start making decisions.'
- Forum Messages:** Sections for 'Your Team Forum Messages' and 'Your Course Forum Messages', both showing 'No new messages'.

Annotations with arrows point to specific elements:

- A box on the left explains: 'You can see system time and your time here. This is useful when participants are from different time zones. Team can use system time to communicate internal deadlines.' It points to the 'Current Time' section.
- A box at the bottom left states: 'Your team-members are listed here.' It points to the team member list.
- A box at the bottom center says: 'Here you can send e-mail to the address that your team-members and instructor have given when they registered.' It points to the 'E-mail' button.
- A box on the right notes: 'Your closest deadline is given here.' It points to the 'Closest Deadline' section.

1. Market conditions



Market Outlook for Practice Round

Demand

All the three markets are experiencing relatively rapid growth in demand for mobile phones. In the USA demand is expected to grow 10% this year, in Asia 20%, and in Europe 15%.

Costs

No significant changes in costs.

Finance

Exchange rates holding steady at the moment, but some turbulence is in the air.

You should read the market outlook before starting to make decisions.

Parameters for Practice Round

Transportation Cost per Product (USD)

USA-->Asia	13.00
USA-->Europe	9.00
Asia-->Usa	13.00
Asia-->Europe	5.00

Feature Cost (USD per feature per product)

USA	6.00
Asia	6.00
Europe	6.00

Investment Cost (USD)

USA	140,000
Asia	160,000

Tariffs per Product (USD)

USA-->Asia	7.00
USA-->Europe	3.00
Asia-->Usa	7.00
Asia-->Europe	3.00

Currency Exchange Rates Compared to USD

USA	1.00
Asia	0.01
Europe	0.86

Administration Cost (USD)

USA	35,000
Asia	10,000
Europe	10,000
Administration of One Plant (first plant)	6,000.00

Face value of share (USD)	10.00
Minimum Cash (all areas) (USD)	2,000.00

Interest Rates

Premium for Short-Term Debt	5.00%
Prime Long Term	
USA	5.00%
Asia	9.00%
Europe	7.00%

Interest Rate for Cash

USA	1.00%
Asia	4.00%
Europe	2.00%

Depreciation (declining balance method)

USA	15.00%
Asia	15.00%

Tax Rates (Income)

USA	35.00%
Asia	15.00%
Europe	30.00%

Parameters here are giving you information about what is happening in the operating environment. These parameters are already inputted in the model. You don't need to input anything.

2. Demand

1. First I need to estimate total market growth for each market area.

2. Here I choose which technology products I sell in each area. Maximum number of products in each area is two. In the beginning I can only sell technology 1 products since other technologies are not ready yet. (see R&D about new product development)

3. Here I estimate market shares for each of my products. Notice that the market shares are estimated per market area, not per technology. Since we have only two teams, the previous round market share is 50%. In this example I have estimated that I can take some market share from my competitor (+5%).

When I have estimated total market growth and my market share, these figures tell me the expected demand in each area. I need to remember that these are only based on my estimations; the final figures will depend on how well I succeed in my decisions relative to my competitors. (See next page introduction to total market and market share.)

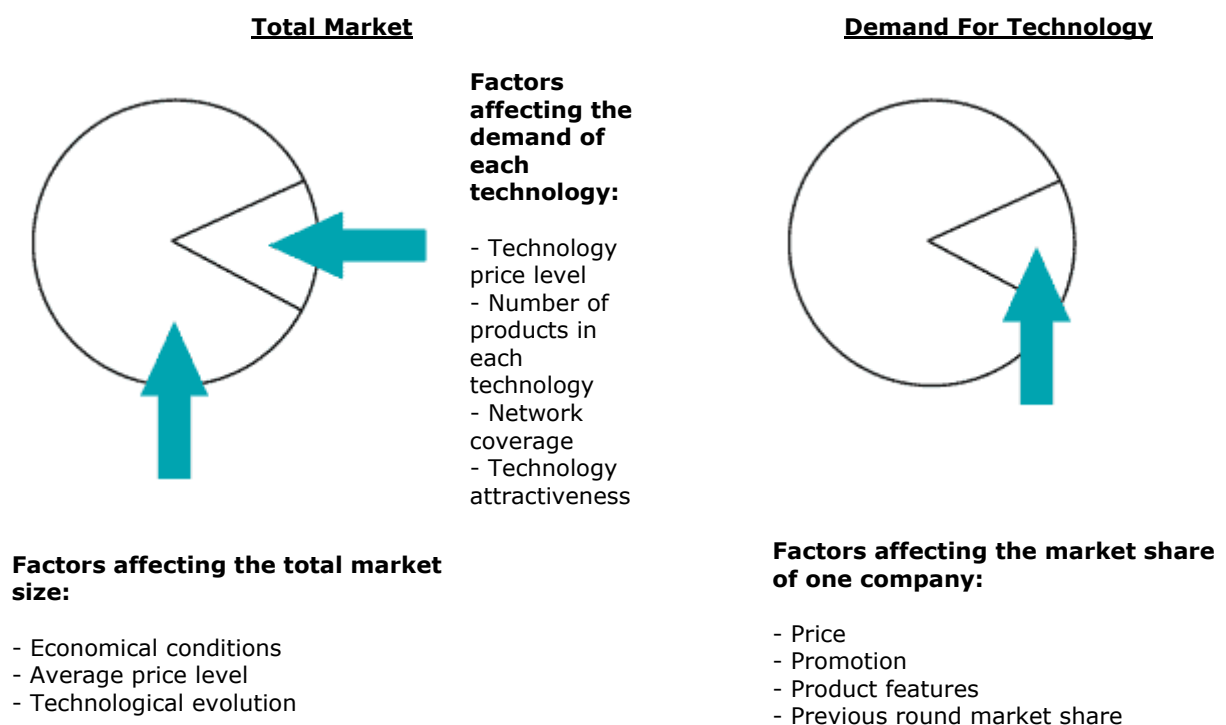
Remember that after each input you need to press "Calculate" or [Enter] to update the figures.

Demand, total market and market share

Demand for a team is determined in three steps. First, the total market size for each market area is calculated. Market outlooks provide a rather good forecast of what is going to happen in the future.

The next step is to split the total market demand into different technologies. Here, the main factors are the average price level of each technology, network coverage, technology attractiveness (typically, new technology is four times more attractive than the old technology) and the number of products available in the market (see figure below). While the network coverage increases, the sales of that technology increase.

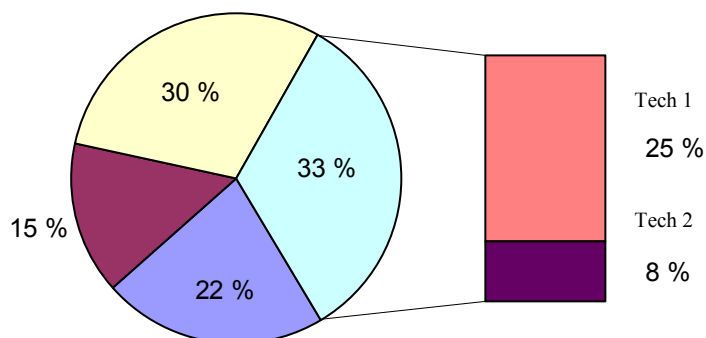
After this, the market shares for each company are determined. The factors affecting the market shares are product features, price, promotion and previous round market share.



In the beginning everyone has the same market share, but as soon as you start making decisions, the market shares start changing. The picture below illustrates an imaginary situation with four different teams.

Market shares:

- Team Yellow 30%
 - Team Purple 15%
 - Team Blue 22%
 - Team Green 33%
- (Team Green market share is further split into two technologies)



3. Production

Global allocation of production is an important success factor in this simulation. You have two production areas that you can use to supply to three market areas and in the long run it becomes important to have a solid production strategy. There are no finished good inventories in this simulation. If you over-estimate your demand and make too high production decisions, the production will be cut automatically. There is an additional cost if production needs to be adjusted during the round. Note that your production will not be increased if you have decided too low capacity utilization. In that situation you will have lost sales.

1. Here I choose which technology I produce in each production line and how much of the production line capacity I allocate to each product. In the beginning I have production facilities only in the USA. In this example I allocate 95% of my USA capacity to Tech 1 since I don't have any other technologies available yet. That seems to be well enough to satisfy my estimated demand.

Here I can decide how much of my production I want to outsource. There is a limit as to how much I can outsource during each round. Outsourcing cost is also given here. I decided not to do any outsourcing this round since I have enough own capacity and outsourcing cost/unit is rather high.

Model automatically calculates the unit cost (see introduction to production costs on the next page). Scrap-rate depends on the capacity utilisation rate and also on the maturity of each technology in production.

Food for thought

When you are deciding whether you should “play safe” and overestimate your capacity need in order for you not to have lost sales or whether you should “run a tight ship” without any excess capacity you need to compare between the opportunity cost of lost sales and the cost of extra capacity. Opportunity cost for lost sales is equal to the lost sales margin for each product that you do not sell and the cost of extra capacity equals the cost for having to cut the production during the round plus the depreciation and finance cost for the production plant.

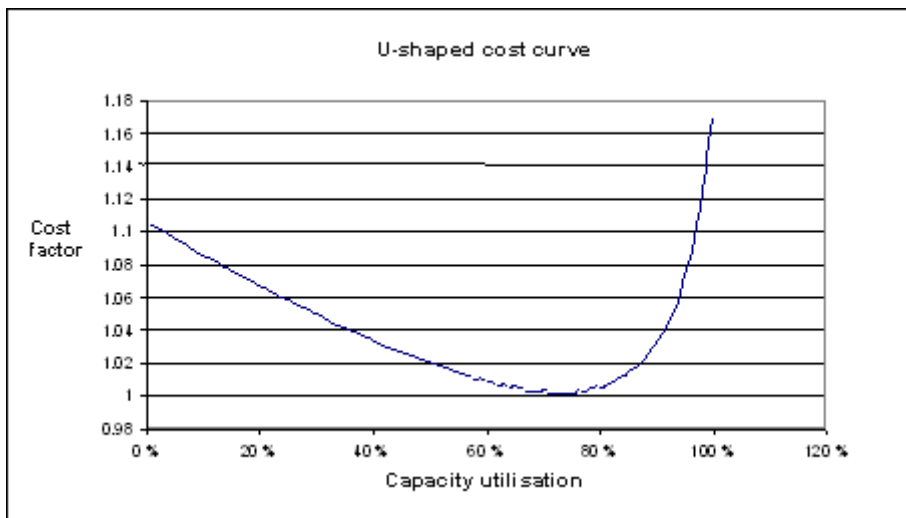
Production costs

The factors affecting the production costs are the following.

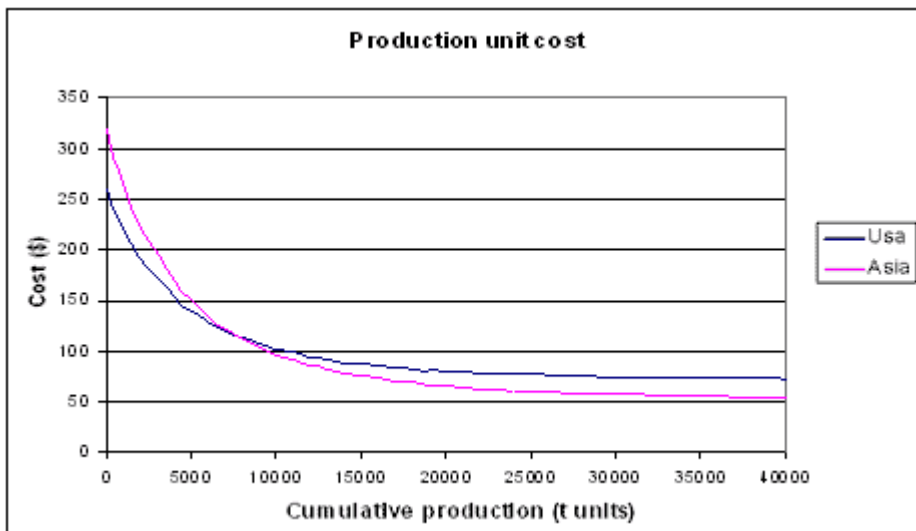
- Basic cost level in the production area
- Production cost function (U-shaped function of capacity utilization rate, too few or too much production is not favourable.)
- Learning curve effect.
- Penalty for having too high production target. This happens if you have over-estimated your demand and your production need to be reduced during the period.

Basic cost level indicates the cost for producing the first unit of the new technology. Due to lower initial employee skills/efficiency, the basic cost is higher in Asia than it is in the US.

U-shaped cost curve can be seen below.



Learning curve effect is a significant factor affecting the production costs. The X-axis represents the cumulative **GLOBAL** production of certain technology. Notice that you can first produce products in USA and then start producing in Asia when the learning curve has reached a certain level. In short, it is possible to utilize the learning effect globally.



4. Investments

The screenshot displays the 'Investments, Practice Round, Veijo - Instructor' interface. It includes a navigation menu at the top and a main data table for 'Demand estimates' and 'Capacity Planning'.

Annotations:

- Left Box:** "1. Here my first task is to estimate global demand for the next two rounds. Future projections are important because it takes two periods to complete new production facilities." (Points to the 'Next round(1)' and 'Round after the next round(2)' columns in the table.)
- Right Box:** "Based on my future growth expectations I have decided to invest into four new production facilities in Asia. They will be available for production two periods from now and I have to pay for them one period from now (middle of the investment cycle)." (Points to the 'New investments' table where 4 plants are entered for Asia in Round 1.)
- Bottom Box:** "This picture helps me to visualise the relationship between my estimated demand (D) and capacity (C)." (Points to the 'Capacity Planning' bar chart.)

Table: Demand estimates

	USA	Asia		
Capacity of one plant (t pcs)	550	550		
			Last round(-1)	This round(0)
Sales / Demand (t pcs)	4,838	6,237	7100	8800 t pcs
Capacity (t pcs)	6,050	6,600	7,150	9,350 t pcs
Number of plants				
	USA	11	12	13
	Asia	0	0	4
New investments (number of plants)				
	USA	1		
	Asia	0	4	
Investment payment (t USD)				
	USA	160,000	0	0
	Asia	0	640,000	0

Table: Capacity Planning

Round	D - Sales / Demand (t pcs)	C - Capacity (t pcs)
Round -1	~5000	~6000
Round 0	~6000	~6600
Round 1	~7100	~7150
Round 2	~8800	~9350

Chart: Capacity Planning

The chart shows Demand (D) and Capacity (C) for each round. Demand bars are blue, and Capacity bars are green. The Y-axis ranges from 0 to 20,000 t pcs.

Bottom Bar: Round: Practice round | Time left to the deadline: 4 d 6 h 13 min

Food for thought

When you make a plant investment you are committing a substantial amount of money into a long-term investment. You need to make sure that you can pay for the investment with the revenue that you are making from it. We can try this calculation: price of the plant is 160 mUSD, economical life of the plant is about seven years and plant capacity is 550 thousand units. We assume that you can sell your products in the future at about the same real price as you are doing currently in the US, about 300 USD. We also assume that your average operating profit before depreciation (all operating costs except plant depreciation are deducted from the sales revenue) remains at about 35% level. When you multiply the annual plant production capacity (We assume that you can use the plant at an average 90% utilization rate) by the expected margin per product you get about 52 mUSD (550 tUnits x 90% x 300 USD x 35%) operating profit before depreciation. From this money you will need to pay for the depreciation and financing costs of the plant. Here depreciation is calculated as 15% depreciation on declining balance. This gives you a depreciation of about 24 mUSD for the first year of operations. (declining balance emphasizes the first years over the last ones, which is reasonable in this kind of high-technology business environment). After depreciation you have 28 mUSD left to cover for financing and investor risk. A widely used measure for investment evaluation is ROI, return on investment, which is calculated as Operating profit (Earnings before interest and taxes, EBIT) divided by the size of the investment. In this case you get an expected ROI of 18% on your investment (28/160). This is not extremely high, but it should be enough to satisfy our investors in the current situation. You can try to test how ROI will change if the average price of the product erodes to 250 USD and your Operating profit before depreciation –margin remains the same. (Result is about 12% ROI)

5. Logistics

With transfer pricing I can adjust my profits between different units. Here I chose to charge Asia and Europe 1,3 times the variable production cost. With this margin I cover for example R&D and other fixed costs. Those costs show as an expense in the US parent company and with transfer pricing I can make other business units to participate in those costs. This can also be used to benefit from different tax rates between countries.

Here I can choose in which order I will satisfy my demand in the markets. In this example I chose 1, 2, 3, meaning that first I deliver to US, then to Asia, and third to Europe. This decision is only relevant if my global supply is not enough to satisfy my global demand. In such a case, first I will cut supplies from third market (Europe), then second market (Asia) and last the US.

In this block I can see where my products are made and where they are expected to be sold.

Food for thought

When you set the delivery priorities you should attempt to maximize your total margin from the products. This can be achieved by prioritising those markets where unit margins are the highest. In other words, if you run out of supply, you want to make sure that it happens in the market where your unit margin is the lowest.

6. Marketing

On this page you decide your marketing mix, namely, product, price, promotion. These decisions will need to be made for each product and market area. Since you have only one product (based on Tech1) in each market in the beginning, you need to make these decisions for one product only in each area. As soon as you have more than one product, you will make the decisions for both products separately. It is important to keep in mind that the success of your marketing mix will be determined by the markets. Customers are comparing between different alternatives and making their purchase decisions accordingly.

The screenshot shows the Cesim Global Challenge interface. The main content area is titled "Technology 1, Practice Round, Veijo - Instructor". It includes a "Save all my decisions as team's decision set" button. The "Product Characteristics" section shows "Features" set to 3 for "This Round" (up from 2 in the "Last Round"). The "Marketing" section shows "Price (YEN)" set to 25500 (up from 25,000) and "Promotion (t YEN)" set to 550000 (up from 495,000). The "Margin calculation (t USD)" table shows a Gross Margin of 84,432. The "Products Available (t pcs)" table shows 1,393 units available in the USA and 0 in Asia.

Annotations:

- First decision I make is to decide the number of features for the product. When I make this decision, I need to take into account that customers in different markets react differently to the product features. In some markets customers are willing to pay for the features, and in some markets they prefer basic device with lower price. I believe that consumers in Asia are appreciative about product features and I set the number of features to three (two last year).
- Price and promotion decisions are set here.
- As soon as I have decided about product, pricing, and promotion, I can see my budgeted financial outcome here.
- Here I can also see where my products are coming from.

Food for thought

When you make your promotion decision (advertising), you should look at the sales margin that you can generate from that product in that market. Usually it is reasonable to "over-spend" in the beginning when you are launching a new product. However, in the medium-term you must be able to pay all your advertising for the product with the sales margin that the product brings in.

7. Research and Development

Calculate

Research & Development, Practice Round, Veijo - Instructor

Save all my decisions as team's decision set Save

Your Own Research and Development

	This Round (t USD)	Last round (t USD)	Money needed to be able to produce a new feature (t USD)
Technology 1	5000	80,000	52,271
Technology 2	214000	50,000	386,158
Technology 3		0	922,001
Technology 4		0	

Buying Technology Licences ? Cost (t USD)

	Cost (t USD)
Technology 1	
Technology 2	
Technology 3	
Technology 4	
Total	0 t USD

Calculate

Production Capability ?

CAN PRODUCE

1 2 3 4
Technologies

Product Features Available ?

5
4
3
2
1
0

1 2 3 4
Technologies

- This Round
- Next Round

When the bar reaches the top line it means that the technology is ready for production.

In these cells I make decisions about my own R&D investments into each technology. The model tells me how much I need invest in order to get new technology or new feature for existing technology. During this round I decided to invest 5mUSD into Tech 1 and that is enough to give me one new feature for next round. In addition, I decided to invest 214mUSD into the development of Tech2 and that was enough to give me basic product for second technology. I need to keep in mind that all results from my R&D investments are available with one period delay.

I can complement my own R&D by buying know-how from outside if a good opportunity arises. This is a typical make-or-buy decision where I need to compare the economical outcomes of both alternatives.

Food for thought

R&D investments are very strategic in nature and it is difficult to apply any exact investment calculation method on those. Even at best, those calculations include heavy assumptions and uncertainties. However, at least when you consider investments into new product features, you need think whether your clients will be ready to pay for the additional features. Following your competitor is not the best alternative, since they can go wrong with their investments. First you must understand your customers.

8. Finance

Finance decisions are typically the last set of decisions that you are making. All financial market transactions are managed through the parent company. You decide about dividend payments, increases/decreases in long-term loans, and share issues and buy-backs. This simulation also gives you the possibility to transfer funds between different countries (International Treasury Management). Internal transfers you want to utilize if you have accumulated substantial cash reserves in Asia or Europe that can be repatriated and distributed to the owners, or you need to finance some plant investments in Asia.

Parent Company Financing Decisions (t USD)

Long-term debt	507,000
Increase / Decrease of Long-Term Debt	
Interest rate for long-term debt USA	5.00%
Asia	9.00%
Europe	7.00%
Number of shares outstanding (t Shares)	30,000
Share Issue (t Shares)	
Issue price (USD)	207
Share Buyback (t Shares)	1500
Buyback price (USD)	207
Dividends	20000
Short-term debt last round	0
New short-term loans taken	0
Payback of short-term loans	-0
Premium for short-term debt	5.00%

Parent Company's Cash Flow Statement (t USD)

Cash Provided by Operating Activities	
EBITDA	383,776
Net financing expenses (-)	23,079
Income taxes	82,065
Total	278,632
Plant investments	140,000
CASH FLOW BEFORE FINANCING ACTIVITIES	138,632
Cash Provided by Financing Activities	
Dividends	20,000
Proceeds from equity issues and buybacks	-310,586
Change in long-term debt (incr + / decr -)	0
Change in short-term debt (incr + / decr -)	0
Change in internal loans	0
Total	-330,586
Change in Cash and Cash Equivalents	
Cash (beginning of year/ round)	323,821
Cash (end of year/ round)	131,867
Internal loans	
USA->Asia (+); Asia->USA (-)	
USA->Europe (+); Europe->USA (-)	

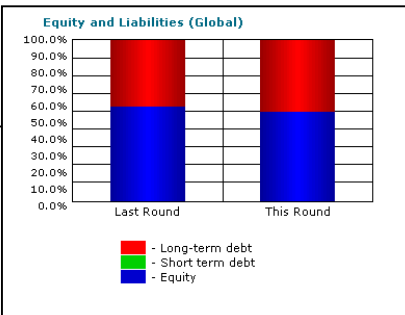
Equity and Liabilities (Global)

Round	Equity	Short term debt	Long-term debt
Last Round	~60%	~30%	~10%
This Round	~60%	~30%	~10%

International Treasury Management

Country	Cash	Local debt
Usa	~112,000	~448,000
Asia	~112,000	0
Europe	~112,000	0

In this picture I can see the capital structure of my company. It is reasonable to try to keep approximately equal amount of debt and equity on my balance sheet.



Here I can make the finance decisions. I have decided to pay 20 mUSD in dividends, and at the same time I have decided to buy back some shares. The reason for buying back shares was that my solvency is at a high level and I have quite substantial cash resources. I will need money for my plant investments in Asia next year, but at that time I hope that my share price has increased and I can sell the shares back to the market with profit. Alternatively I can finance the plant investment with some new long-term loans next year.

Here I can transfer funds between different countries. Picture on the left tells the situation. At the moment there does not seem to be much need for internal transfers.

Food for thought

The reason why you should keep approximately equal amount of equity and debt on your balance sheet is that by doing it you minimize your cost of capital. The smaller the cost of capital, the higher is the net present value of all your company's future cash flows, thus higher the market value of your company.

Budgets

The budget pages update continuously as you make decisions. Here you can follow profitability for the group as a whole and for each area separately. Last round actual figures are presented in the right-hand side column. We will return to these pages with analysis and interpretation during the simulation rounds. At this stage you should just aim to as high profit for the year as possible, without sacrificing your future growth potential. That will lead to favorable share price development and happy investors!

Picture 1: Profit and loss statement

Your team's latest decisions are saved by Veijo - Instructor.

Profit & Loss, Practice Round , Veijo - Instructor Save all my decisions as team's decision set [Save](#)

	This round (t USD)	Last round (t USD)
Turnover	1,466,301	1,212,822
Costs and Expenses		
Variable production costs	490,369	348,107
Feature costs	65,389	58,050
Outsourcing costs	0	31,218
Transportation	50,363	35,821
R&D	219,000	130,000
Advertising	34,720	30,960
Administration	98,802	95,857
Costs and Expenses Total	958,643	730,013
OPERATING PROFIT BEFORE DEPR. (EBITDA)	507,658	482,809
Depreciation from fixed assets	126,225	148,500
OPERATING PROFIT (EBIT)	381,433	334,309
Net financing expenses	20,133	23,097
PROFIT BEFORE TAXES	361,300	311,212
Income taxes	108,658	105,109
PROFIT FOR THE YEAR	252,642	206,103

Notes to the Profit and Loss statement:

In this simulation all R&D and marketing (advertising) costs are expensed on the profit and loss statement during the year the investment are made. Even though those are long-term investments in nature, they are also rather risky investments with uncertain payback. Following the conservative approach in bookkeeping, we have decided to expense those investments immediately. As a consequence from this, profit for the year may fluctuate depending on the intensiveness of R&D and marketing investments. You should always plan your R&D and marketing investments carefully. It is easy to lose substantial amounts of money with careless R&D and marketing investments.

R&D is considered to take place in the area(s) where you have production plants. I.e., if you have production plants only in the US, all your R&D shows in the USA P&L statement. When you have production in Asia also, R&D will be split between the countries relative to the number of production facilities. You can use transfer pricing to roll R&D costs to other areas (Asia, Europe).

Picture 2: Balance sheet

The screenshot shows the Cesium Global Challenge web application interface. The top navigation bar includes 'Home', 'Decisions', 'Results', 'Schedule/Tasks', 'Readings', 'Teams', and 'Communications'. Below this is a secondary menu with 'Instructions', 'Decision Checklist', 'Market Conditions', 'Demand', 'Marketing', 'Production', 'Logistics', 'R&D', 'Finance', and 'Budgets'. The 'Finance' menu is expanded to show 'Profit & Loss' and 'Balance Sheets'. The main content area displays the balance sheet for 'Veijo - Instructor' in 'Practice Round'. The balance sheet compares 'This Round (t USD)' and 'Last Round (t USD)'. The total assets are 1,136,159 t USD in the current round and 1,214,103 t USD in the last round. The total equity is 629,159 t USD and 707,103 t USD, respectively. The total liabilities are 507,000 t USD in both rounds. The total shareholders' equity and liabilities are 1,136,159 t USD and 1,214,103 t USD. At the bottom, a status bar shows 'Round: Practice round', 'Account: Veijo - Instructor', 'Time left to the deadline: 3 d 21 h 54 min', and 'Your local time: 23:10'.

Balance Sheet, Practice Round, Veijo - Instructor		
	This Round (t USD)	Last Round (t USD)
ASSETS		
Fixed assets	855,275	841,500
Cash and cash equivalents	280,884	372,603
Total Assets	1,136,159	1,214,103
SHAREHOLDERS' EQUITY AND LIABILITIES		
Equity		
Share capital	325,000	340,000
Other restricted equity	-295,586	0
Profit for the year	252,642	206,103
Profits from previous years	347,103	161,000
Total Equity	629,159	707,103
Liabilities		
Long term loans	507,000	507,000
Short term loans (unplanned)	0	0
Total Liabilities	507,000	507,000
Total Shareholders' Equity and Liabilities	1,136,159	1,214,103

Notes to the balance sheet

Asset side includes currently only fixed assets and cash & cash equivalents. Cash adjusts automatically if the company has excess cash available, i.e., money that is not used in investments or financial transactions (loan repayment, equity buyback, dividend payment).

Other restricted equity in this simulation indicates the difference between share issue/share buyback price and the nominal value of the share (10 USD). Since I have made a buyback of 1,5 million shares at an approximate average price of 207 USD, my restricted equity shows approximately -295500 thousand USD, which is calculated as $(207 - 10) \times 1500000$.

Short-term loans are taken automatically if the company does not have enough liquidity to run the operations.

Food for thought

Since your goal in the simulation is to maximize the shareholder value, you should pay attention to the balance sheet as well. Smaller balance sheet is better than bigger balance sheet. If you can generate the same profit with smaller balance sheet you have utilized your assets effectively and thus well managed the funds that your investors have given for you to manage.