Simulation business game "Three heroes"

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Purpose of the Game

To practice knowledge and skills, received during financial education.

- How to calculate first cost of the product?
- How much money we need for the growth?
- How working capital will be changed, if sales grow up?
- How to calculate break even point?
- How to execute operative financial forecasting ?
- Why companies need to forecast balance sheet?

Terms

- **Gross profit –** A company's total revenue (equivalent to total sales) minus the cost of goods sold
- **Operating profit (EBIT) –** The profit earned from a firm's normal core business operations
- **Net profit** – Net profit is calculated by taking revenues and adjusting for the cost of doing business, depreciation, interest, taxes and other expenses
- **Goods first cost** – The sum of the initial expenditures involved in capitalizing a property; includes items such as transportation, installation, preparation for service, as well as other related costs
- **Cost of goods sold (COGS)** – cost of goods sold in reporting period
- **Gross margin –** A company's total sales revenue minus its cost of goods sold, divided by the total sales revenue, expressed as a percentage
- **Operating margin -** can be calculated by dividing a company's operating profit during a given period by its net sales during the same period
- **Return of sales (net margin)** – a ratio of profitability calculated as after-tax net profits divided by sales (revenue)

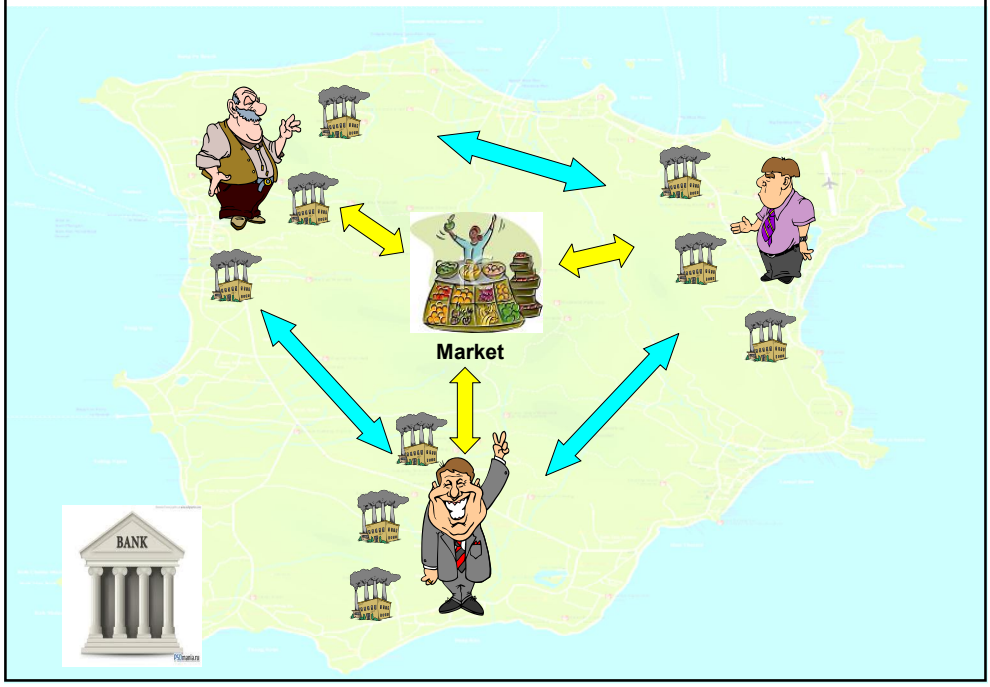
Terms (continuation)

- **CE-** Capital Employed – total assets less current liabilities
- **ROCE** – Return on Capital Employed is a financial ratio that measures a company's profitability and the efficiency with which its capital is employed. ROCE is calculated as: ROCE = Earnings Before Interest and Tax (EBIT) / Capital Employed (average)
- **ROA** – Return of assets. An indicator of how profitable a company is relative to its total assets. Calculated by dividing a company's annual net earnings by its total assets (average)
- **FL –** Financial Leverage is calculated as , FL=Total assets/ equity
- **DII (days)-** Days in Inventory is an efficiency ratio that measures the average number of days the company holds its inventory before selling it. Inventory levels (measured at cost) are divided by COGS per day.
- **(DSO) (days) –** Days sales outstanding **-** A measure of the average number of days that a company takes to collect revenue after a sale has been made and can be calculated by dividing the amount of accounts receivable during a given period by the total value of sales during the same period, and multiplying the result by the number of days in the period measured.

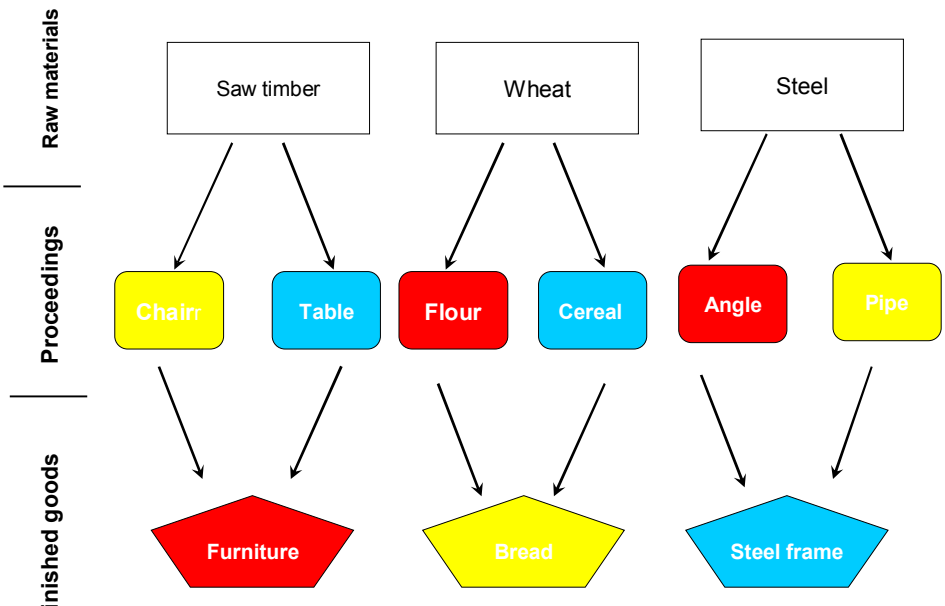
Terms (continuation)

- **DPO (days)-** Days Payable Outstanding. A company's average payable period. Days payable outstanding tells how long it takes a company to pay its invoices from trade creditors, such as suppliers. The formula to calculate DPO is written as: ending accounts payable / (cost of sales/number of days).
- **Cash flow** – Cash flow is the net amount of cash and cash-equivalents moving into and out of a business.
- **Operating cash flow** – Operating Cash Flow (or OCF) is a measure of the amount of cash generated by a company's normal business operations
- **Cash flow from financial activities** – A category in a company's cash flow statement that accounts for external activities that allow a firm to raise capital and repay investors, such as issuing cash dividends, adding or changing loans or issuing more stock.
- **Overdraft** – An extension of credit from a lending institution when an account reaches zero. An overdraft allows the company to continue withdrawing money even if the account has no funds in it.

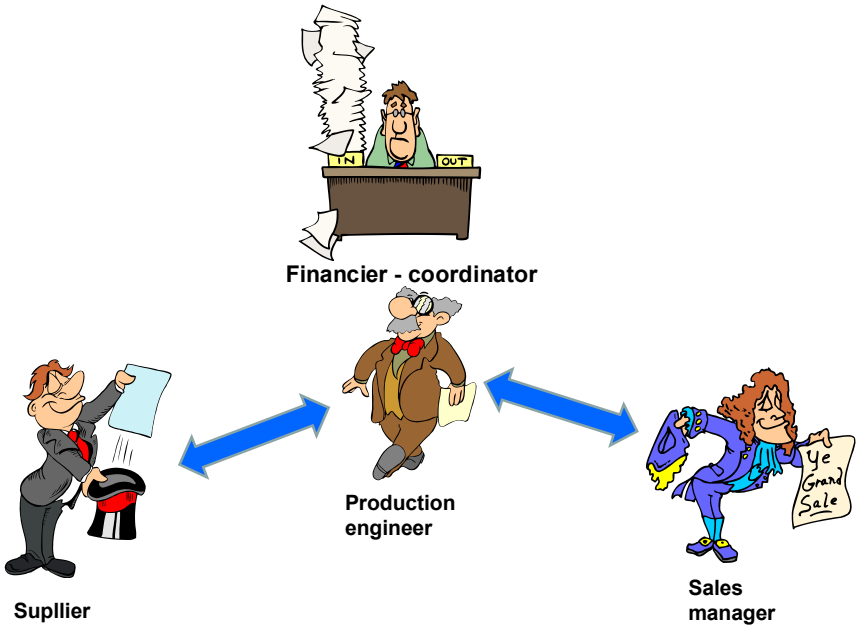
Competitors-partners



Goods exchanges chart



Team roles allocation



Rules

- Raw materials are possible to purchase in the “market” only at fixed price.
- Finished goods are possible to sell in the “market” only at fixed price, «market» purchases finished goods only.
- Proceedings are possible to purchase in the “market” at fixed price and from other game participants at negotiated price.
- Every team produces two types of proceedings and one type of finished goods.
- Finished goods, produced in current month, are possible to sell in next months only.
- Raw materials and proceedings, purchased in current month, are possible to sell not earlier of next months.
- Game lasts 5 periods (months)

Payment period

- Payment period to the «market» for raw materials and proceedings - 1 month
- Payment period by the «market» for finished goods - 1 month
- Payment period for proceedings, between the game participants, is negotiable and can be 0, 1 or 2 months.
- Payment period for proceedings in month 4 is not bigger than 1 month.
- Payment period for finished goods, raw materials and proceedings in month 5 – 0 months.

Penalties

- If the Seller signed the contract for the goods he doesn't have or lacks in stock, the deal will be canceled.
- In this case the Seller will pay 20% of contract amount as a penalty to the benefit of the Buyer.

Example:

Buyer	Seller	Good	Quantity, ton	Price	Payment time	Amount	in stock, tons
Space	MNP	Angle	2,8	26 000	1	72 800	2,78
Penalty,receved		Penalty paid					
Space	14 560	MNP	14 560				

20%

Bank

Loan interest rate within limit – 2% monthly.

Loan interest rate over limit – 10% monthly.

Overdraft interest rate - 20% monthly.

The amount of Loan should be announced in the beginning of the month, Loan balance limit is 10 000 000 rub., Over limit loan is subject to higher interest rate.

Loan repayment is voluntary, should be mentioned in the form with a negative sign.

Overdraft is given automatically to cover the lack of own funds.

Teams goods balance in warehouses in the beginning of the game

	The unit of	Balance	
	measure	Quantity	Unit cost
Saw timber	м3	10,0	0
Table	Unit	52,0	0
Wheat	kg.	13 200,0	0
Flour	kg.	8 250,0	0
Cereal	kg.	7 333,0	0
Steel	tons	3,5	0
Angle	tons	3,0	0
Pipe	tons	2,5	0
Furniture	set	0,0	0
Bread	kg.	0,0	0
Steel frame	tons	0,0	0
Chair	Unit	100,0	0

Production

Productions				
Player 1				
Product		**Capacity**	**Raw 1**	**Raw 2**
Furniture	**set**	6 000	Table	Chair
Flour	**Kg.**	950 000	Wheat	
Angle	**ton**	170	Steel	
Player 2				
Product		**Capacity**	**Raw 1**	**Raw 2**
Bread	**Kg.**	1 600 000	Flour	Cereal
Table	**Unit**	5 000	Saw timber	
Pipe	**ton**	450	Steel	
Player 3				
Product		**Capacity**	**Raw 1**	**Raw 2**
Steel frame	**ton**	530	Angle	Pipe
Chair	**Unit**	16 500	Saw timber	
Cereal	**Kg.**	320 000	Wheat	

Market prices (initial)

Market prices		
	Unit	**Price**
Raw materials		
Saw timber	rub/m3	6000
Wheat	rub/kg	5
Steel	rub/tn	19000
Finished goods		
Furniture	rub/set	4950
Bread	rub/kg	17,2
Steel frame	rub/tn	56187
Proceedings		
Table	rub/tn	1664
Chair	rub/tn	792
Flour	rub/tn	10,8
Cereal	rub/tn	11,9
Angle	rub/tn	33818
Pipe	rub/tn	32172

External factors

Some events happen and affect prices, for example:

1. Heavy rains have complicated timber transportation from the forest, which increased saw timber prices by 10%, and furniture prices by 5%.

2. Due to the start of a new foundry, steel prices decreased by 9%, steel frame prices decreased by 5%.

Fixed assets and administrative expeditures

Initial fixed assets value		10 000 000	Rub
Depresiation rate (monthly)		0,5%	
Total and administrative expences (monthly)		100 000	Rub

Contracts list form

Contracts for purchasing raw materials and proceedings and for finished products selling.

month_____

							Sugnatures of the	
Numbe	Buyer	Seller	Good	Quantity	Price	Payment time*	Buyer	Seller
1		First						
2		First						
3		First						
4		First						
5		First						
6		First						
7		First						
8								
9	First	Market				1		
10	First	Market				1		

* Payment period: 0- immediate payment , 1- payment via month after delivery 2- payment via 2 months

Contracts list form (example)

Contracts for purchasing raw materials and proceedings and for finished products selling.

month_____

							Sugnatures of the	
Numbe	Buyer	Seller	Good	Quantity	Price	Payment time*	Buyer	Seller
1	Second	First	Flour	2000	7	2		
2	Third	First	Angle	10	27000	0		
3	Market	First	Furniture	20	4950	1		
4		First						
5		First						
6		First						
7		First						
8								
9	First	Market	Steel	15	19000	1		
10	First	Market				1		

Production and Loan form

	Production application		
month	_____	company 1	First
Number	Products	Quantity	Loan
1	Furniture		
2	Flour		
3	Angle		

Cash forecasting

Balance sheet forecasting, month 1	**First**	
	on 1.01	on 1.02
ASSETS		
Fixed asset (initial value)	10 000 000	
Accumulated depresiation	0	
Fixed assets (book value)	10 000 000	
Commodity stocks	599 232	
Work in progress	0	
Accounts receivable	0	
Cash	0	
Total assets	**10 599 232**	
EQUITY		
Share capital	10 599 232	
Retained earnings of last months	0	
Profit of current month	0	
LIABILITIES		
Accounts payable	0	
Loan	0	
Overdraft und unpaid interest	0	
Total equity and liabilities	**10 599 232**	

Company reports

Month 1

First

Goods movemens report

	Balance in the beginni		Incoming		Expense		Balance in thr end		Produced
Name	**Quantity**	**Unit cost**	**Quantity**	**Unit cost**	**Quantity**	**Unit cost**	**Quantity**	**Unit cost**	**Quantity**
Saw timber	10,0	6 000	0,0	0	-10,0	6 000	0,0	0	
Table	52,0	1 280	52,0	1 350	-100,0	1 315	4,0	1 315	
Wheat	13 200,0	5	20 000,0	5	-24 000,0	5	9 200,0	5	
Flour	8 250,0	8	0,0	0	-8 250,0	8	0,0	0	20 000
Cereal	7 333,0	9	0,0	0	-7 333,0	9	0,0	0	
Steel	3,5	19 000	10,0	19 000	-13,0	19 000	0,5	19 000	
Angle	3,0	25 050	0,0	0	-3,0	25 050	0,0	0	10
Pipe	2,5	26 810	0,0	0	-2,5	26 810	0,0	0	
Furniture	0,0	0	0,0	0	0,0	0	0,0	0	100
Bread	0,0	0	0,0	0	0,0	0	0,0	0	
Steel Frame	0,0	0	0,0	0	0,0	0	0,0	0	
Chair	100,0	660	200,0	750	-300,0	720	0,0	0	

First

Production report

Produced	**Quantity**	**Unit cost**	**Total cost**
Furniture	100	3 515	351 500
Consumed			
Table	100	1 315	131 500
Chair	300	720	216 000
Wages	100	40	4 000
TOTAL			**351 500**

Produced	**Quantity**	**Unit cost**	**Total cost**
Flour	20 000	8	160 000
Consumed			
Wheat	24000	5	120 000
Wages	20 000	2	40 000
TOTAL			**160 000**

Produced	**Quantity**	**Unit cost**	**Total cost**
Angle	10	25 050	250 500
Consumed			
Steel	13	19 000	247 000
Wages	10	350	3 500
TOTAL			**250 500**

First

Financial analysis report

Name	**Unit**	**month 1**	**Accumu-lated**
Gross margin	%	4,4%	4,4%
Operational margin	%	-38,5%	-38,5%
Net margin (ROS)	%	-41,4%	-41,4%
ROCE	%	-1,2%	
ROA		-1,3%	
Stock turnover	days	29,6	
DSO	days	23,3	
DPO	days	19,8	
FL on the end of the month		1,09	

Company reports (2)

First

Profit and loss statement

Sales revenue	**349 539**
Cost of goods sold	-334 172
Gross margin	**15 367**
Total and administrative expenses	-100 000
Depresiation	-50 000
Operational pofit	**-134 634**
Penalties (paid and receved)	0
Loan interest	-10 000
Overdraft interest	0
Net earning	**-144 634**

First

Cash flow statement (direct method)

Incomes gron sales	**78 000**
Payments to suppliers	-70 200
Payments of wages	-47 500
Total and administrative expenses	-100 000
Penalties (paid and receved)	0
Loan interest paymens	-10 000
Overdraft interest of last month	0
Operational cash flow	**-149 700**
Loan	500 000
Overdraft of current month	0
Financial cash flow	500 000
CASH FLOW TOTAL	**350 300**

First

Cash flow statement (indirect method)

Net earning	-144 634
Depresiation	50 000
Total profit+ depresiation	**-94 634**
Stock change	538 472
Work in progress change	-762 000
Accounts recevables change	-271 539
Accounts payables change	440 000
Overdrafft interest debt change	0
Operational cash flow	**-149 700**
Financial cash flow	**500 000**
CASH FLOW TOTAL	350 300

Company reports (3)

First		
Balans sheet report		
	на 1.01	на 1.02
ASSETS		
Fixed asset (initial value)	10 000 000	10 000 000
Accumulated depresiation	0	50 000
Fixed assets (book value)	10 000 000	9 950 000
Commodity stocks	599 232	60 760
Work in progress	0	762 000
Accounts receivable	0	271 539
Cash	0	350 300
Total assets	**10 599 232**	**11 394 599**
EQUITY		
Share capital	10 599 232	10 599 232
Retained earnings of last months	0	0
Profit of current month	0	-144 634
LIABILITIES		
Accounts payable	0	440 000
Loan	0	500 000
Overdraft und unpaid interest	0	0
Total equity and liabilities	**10 599 232**	**11 394 599**

Closing-down

After the end of fifth (last) month…

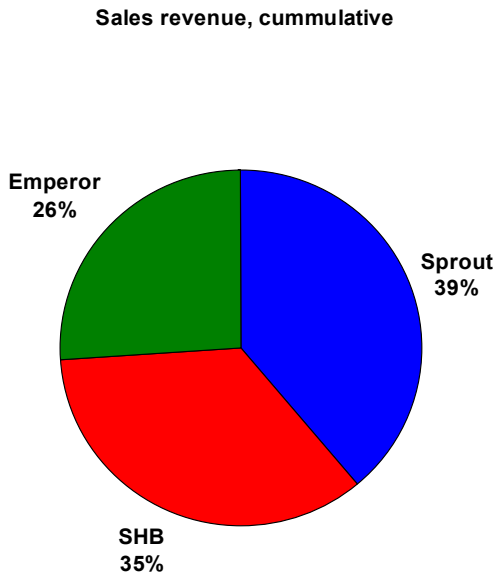
a) Finished goods produced in fifth month will be sold for market prices
b) Proceedings produced in fifth month will be sold at price equal 100% of their cost.
c) All other stocks will be sold at price equal 80% of their cost
d) Unpaid balance of loan and overdraft will be repaid automatically
e) The team that will have maximum cash at the end of the game will be the winner

Result analysis

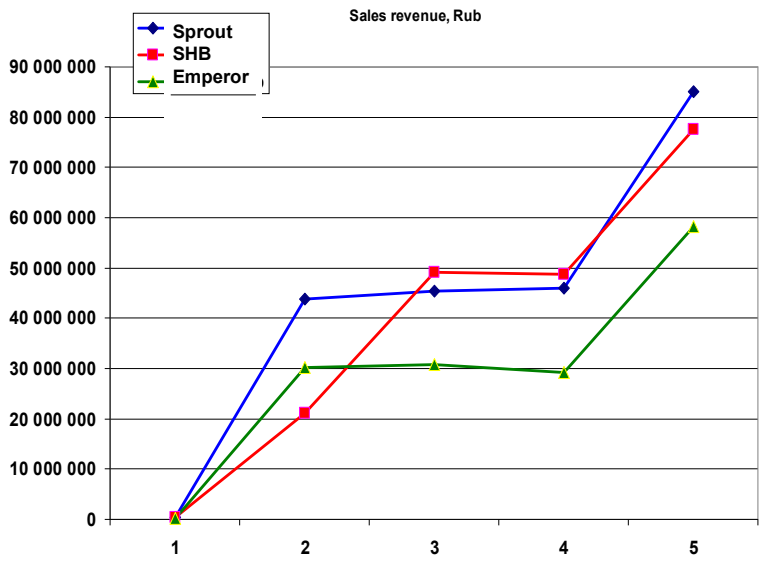
Results analysis

- Market share
- Sales growth dynamics
- Profit and profitability
- Sales and working capital correlation
- Cash cycle analysis
- Financing
- Profit and cash flow
- Conclusions

Market share

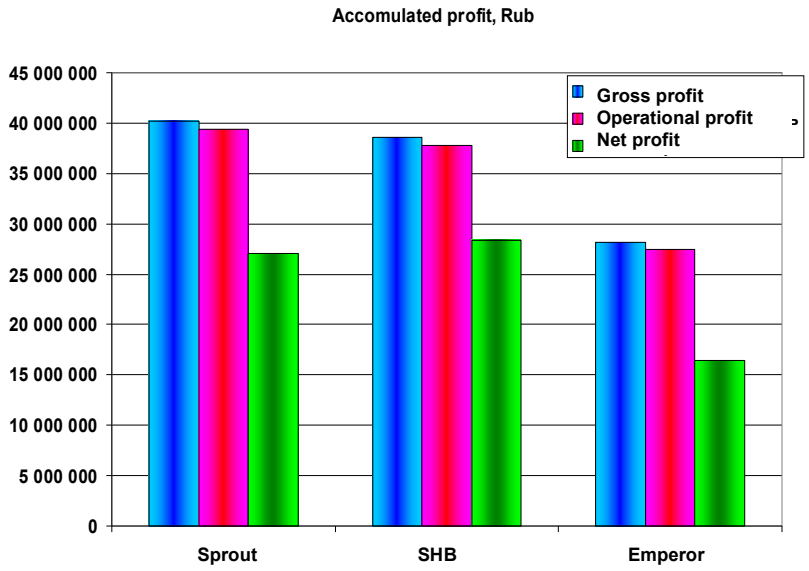


Sales growth dynamics



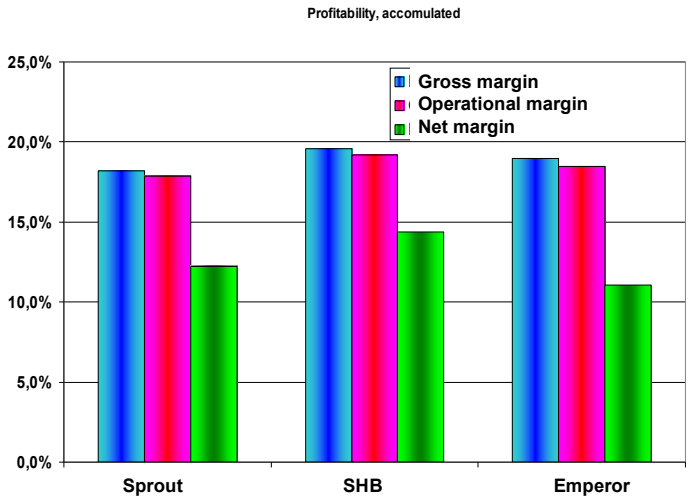
Thanks to the stable outrunning growth, the teams Sprout and SHB fought for the victory up to the end, team Emperor could not contend with them due to the lack of proceedings production.

Earnings



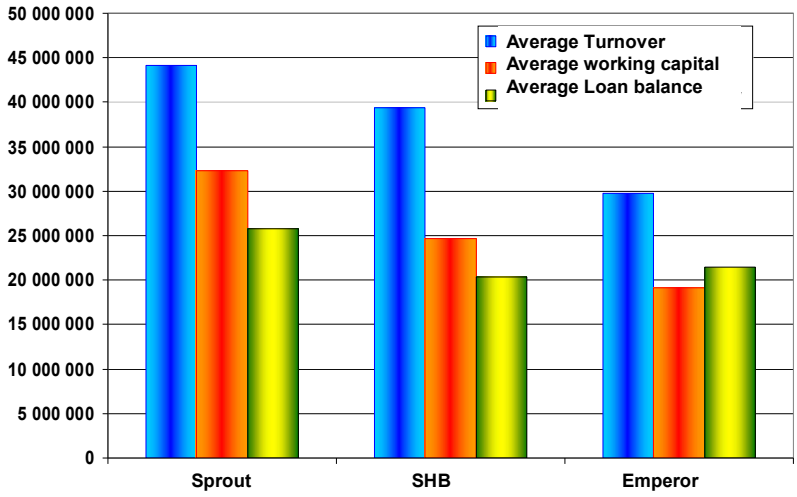
The difference between operational and net profits caused by loan and overdraft interest

Profitability



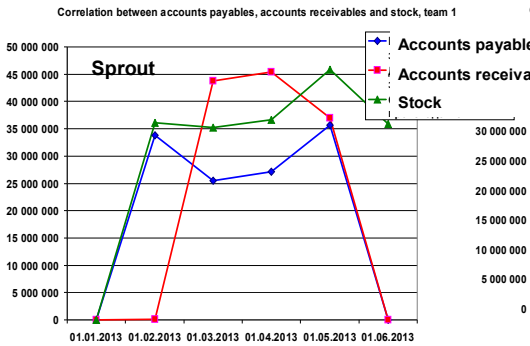
SHB team received the biggest gross, operational and net margin (first of all because of relatively small interest) and won in spite of only the second place in sales.

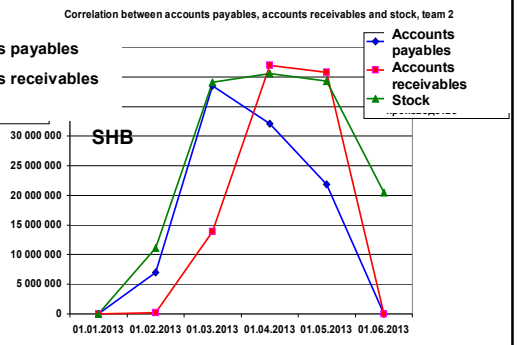
Sales and working capital correlation

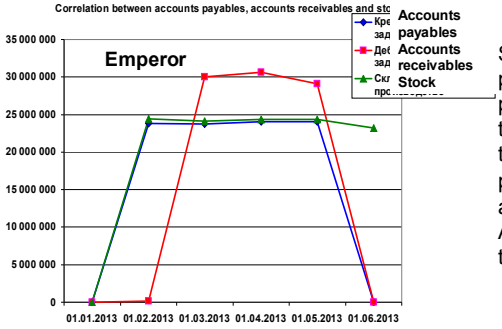


Sales volumes growth needs investments into the working capital, mainly financed by the loan.

Correlation between accounts payables, accounts receivables and stock

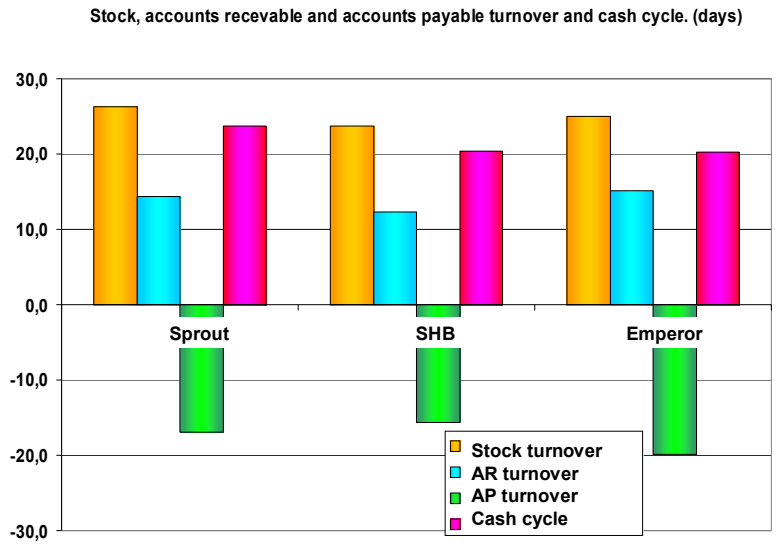






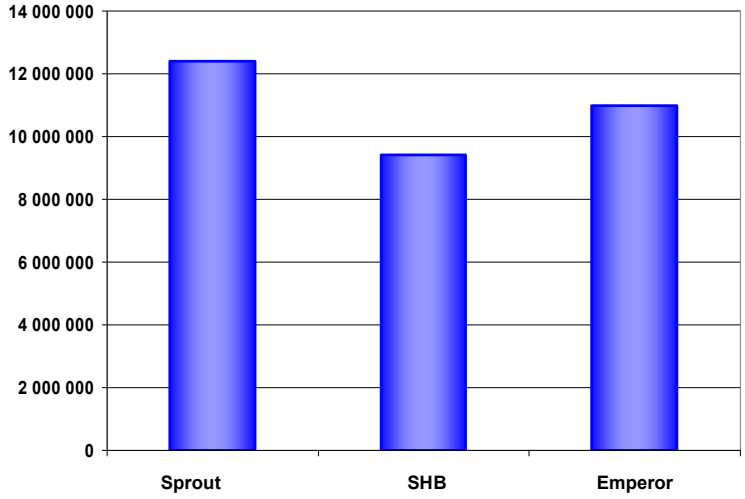
Stock and unfinished production have been partly financed at the expense of accounts payables(AP). Accounts receivables(AR) in the first half of the game were substantial due to the preference of deals with payments postponement by participants. In fifth month all payment periods were 0, therefore AP and AR were fully repaid in accordance with game terms.

Cash cycle analysis



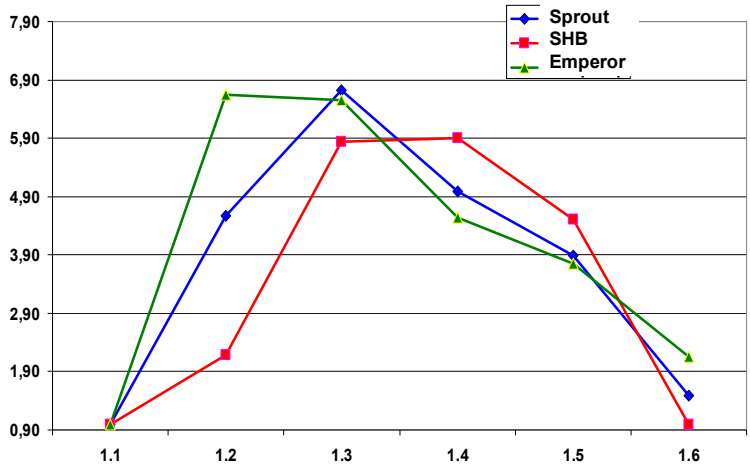
Team SHB reached cash cycle minimum. It means that SHB invested less cash in the working capital compare to the other teams.

Loan interest



Team SHB has shown the most efficient strategy, with huge gap team Emperor reached second place.

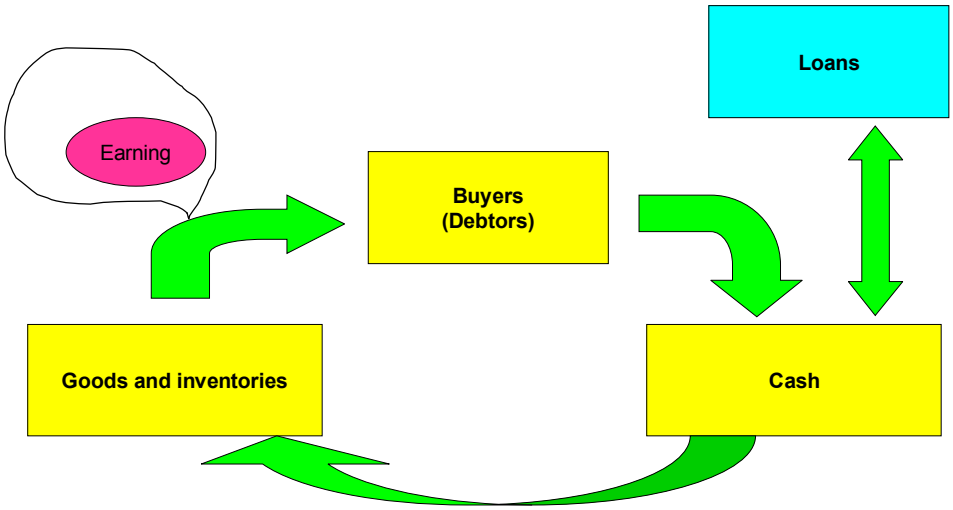
Financial leverage



Teams used different strategies of financing. Team Emperor used sufficient amount of loan from the beginning and started to decrease financial leverage in 4th and 5th months only. Teams SHB and Sprout increased the loan in two first months and then made efforts to decrease the proportion of borrowed funds.

Cash and Earning

Cash and earning are not the same !



How much does the working capital cost for the business ?

It is necessary to finance the sales growth (Loan and overdraft interest)

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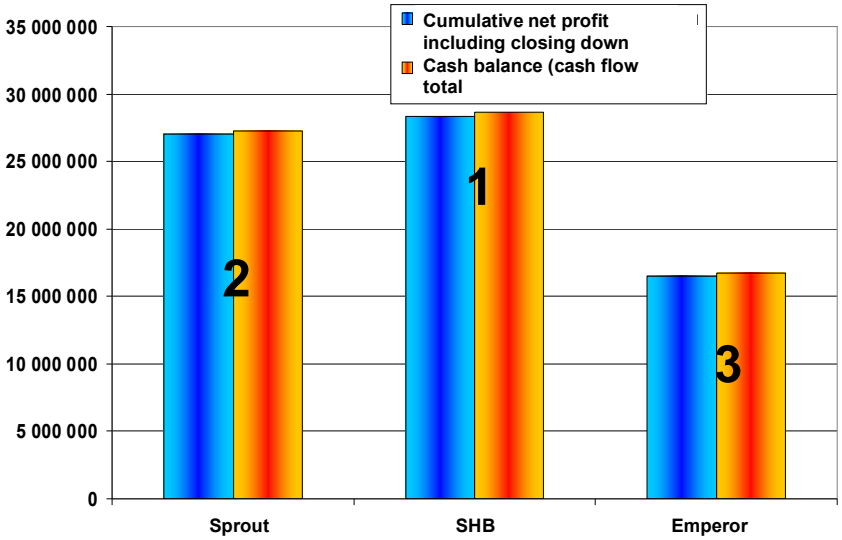
The Winner is SHB!



The difference between profit and cash flow caused by accumulated depreciation.

Conclusions

- Sales grow – working capital grow – financial expenses increase
- Economy of scale (Production volumes growth reduce fixed costs influence)
- Cash ≠ Profit
- «Frozen» raw materials, proceedings and finished goods are the source of expenditures