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**«НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ  
ТОМСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»**

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УТВЕРЖДАЮ

Директор ИСГТ

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## **Financial Management**

Course Paper  
Materials

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## Purpose

Economic assessment of a small business start up in a form of public limited company (plc)

## Goal

To define conditions, which will help the business to be economically sound

- Define minimum market price which will allow profits enough to pay set amount of dividends at a minimum production volume

## Input Data

Input data for the course paper is given in table 1.

Table 1. Input Data

Data	Metrics
1. Weight of the product	kg
2. Ratio of material consumption	%
3. Price of material	rub./kg
4. Labor intensiveness of production (by operations)	min./unit
5. Annual time fund for equipment	hours/year
6. Annual time fund for production workers	hours/year
7. Price per unit of equipment, used in operations	rub./unit of eq.
8. Rate of work for each operation	
9. Dimensions of equipment used for specific operations	m <sup>2</sup> /unit of eq.
10. Turnover period for materials in inventory (Days in materials)	days
11. Turnover period for finished goods (Days in FG)	days
12. Days in accounts receivable	days
13. Days in accounts payable	days
14. Level of dividend payments	%

Each student has to choose his variant for calculation based on the last 2 digits of his student's credit book number (01 stands for 1<sup>st</sup> variant, 27 – for 27<sup>th</sup> variant) see input data in supplement 1

### Section 1. Determining the structure of assets and the sources of assets for the business.

The form for the structure of assets and the sources of assets for the business is given in table 2 and table 3.

Table 2. Assets structure

Assets
1. Equipment
2. Facilities (buildings)
3. Material current assets
4. Cash and cash equivalents

Table 3. Assets structure

Sources of Assets
1. Equity
2. Rent
3. Short-term Debt
4. Accounts payable
5. Amortization

Later

6.	Retained earnings					Later	
	Assets	1	2	3	4	5	6
1.	Equipment	E	E	E	R	E	E
2.	Facilities (buildings)	E	R	R	R	E	R
3.	Material current assets	E	E	D	D	D	E
4.	Cash and cash equivalents	E	D	D	D	D	E

E – Equity  
R – Rent  
D – Short-term debt

Students have to consider advantages and disadvantages of each type of financing, plus the advantages and disadvantages of their variant of financing.

## Section 2. Determining the need for business assets

The form for the business assets is given in table 4

Table 4. Business assets form

	Assets
1.	Technological equipment
2.	Additional equipment
3.	Production tools
4.	Facility (production, warehouse, office)
5.	Intangibles
6.	Materials
7.	Work in Progress
8.	Finished Goods
9.	Accounts receivable
10.	Cash and cash equivalents

### 2.1 Technological Equipment

$$C_{TE} = \sum_{i=1}^m O_i \cdot P_i \quad (1)$$

where

$m$  – number of operations;

$O_i$  – number of equipment units, used for  $i$ -operation;

$P_i$  – price of equipment unit, used for  $i$ -operation; (given in the input data).

Number of equipment units, used for  $i$ -operation:

$$O_i = \frac{\sum_{j=1}^n Q_j \cdot t_{n_{ij}}}{F_{D_0} \cdot 60}, \quad (2)$$

where

$n$  – nomenclature of products;

$Q_j$  – annual volume of production, units / year;

$t_{nij}$  – time norm for production of  $j$ -product during  $i$ -operation;

$F_{D0}$  – annual time fund for equipment hours/year (input data).

In this formula nomenclature of products and volume of production should be defined by the demands on the market. In the context of this course paper we will omit the market research to define these parameters. Instead we will produce a figurative product. Also we will define the maximum production volume depending on 100% capacity of the most labor intensive equipment operation. This will be our “bottle-neck”.

$$Q_{\max} = \frac{F_{D0} \cdot O_M \cdot 60}{t_{n_{\max}}}, \quad (3)$$

where

$O_M$  – number of equipment units used in most labor intensive operation;

$t_{n_{\max}}$  – time norm for most labor intensive operation (from input data).

$O_M$  may be taken 1 or 2. If it's 1 unit, then all other operation will require less than 1 unit of equipment. But because it's impossible, then all other operations will require 1 unit of equipment which will not be used up to 100% capacity.

If  $O_M$  is 2 units, then all other operations may require 1 or 2 units of equipment. To calculate the number of units needed for other operations we will use the following formula

$$O_{P_i} = \frac{Q_{\max} \cdot t_{n_i}}{F_{D0} \cdot 60}. \quad (4)$$

$Q_{\max}$  is the maximum capacity of the business we are starting up.

Students have to calculate the equipment utilization ratio for each operation and build a graph showing it.

## 2.2 Cost of additional equipment

The cost of additional equipment is about 30% of the cost of technological equipment

## 2.3 Cost of production tools

The cost of production tools ( $C_{PT}$ ) will be 10 – 15% of the cost of technological equipment

## 2.4 Facilities

The need for facilities will depend on the need for

- production facilities
- warehouse facilities
- office facilities

**Production facilities space** ( $S_{PR}$ ) will be calculated according to the formula

$$S_{PR} = \sum_{i=1}^m S_i O_i k_f$$

$S_i$  - dimensions of equipment, used for  $i$ -operation (m<sup>2</sup>/unit of eq.)

$O_i$  - number of units of equipment used for  $i$ -operation

$k_f$  - additional space coefficient ( $k_f = 2-3$ )

**Warehouse facilities space** can be evaluated as 30 – 50% of the production facilities space

**Office facilities space** will require 20 – 30 square meters.

## 2.5 Cost of intangibles

The cost of intangibles ( $C_{INT}$ ) includes the cost of software, which is about 30 – 50 thousand rubles.

## 2.6 Cost of materials

Cost of materials can be calculated according to the following formula:

$$C_{PM} = \frac{g_n \cdot Q_a \cdot P_M}{360} T_M$$

$C_{PM}$  - Cost of production materials

$g_n$  - norm of materials' consumption (kg/unit)

$Q_a$  - annual production volume (units) (maximum production volume)

$P_M$  - price of materials (rub) (given in the input data)

$T_M$  - length of one consumption cycle for materials (days in materials) (days) (given in the input data)

### Norm of materials' consumption

$$g_n = \frac{g_g}{k_{mu}}$$

$g_g$  - weight of the finished good (kg)

$k_{mu}$  - coefficient of material utilization.

## 2.7 Cost of Work in Progress

Cost of work in progress ( $C_{WP}$ ) can be established from the following formula:

$$C_{WP} = \frac{Q_a \cdot T_{pc} \cdot C \cdot k_r}{360}$$

$T_{pc}$  - production cycle length (days in inventory) (days)

$C$  - cost of the unit of finished goods

$k_r$  - coefficient of finished goods readiness

**Production cycle** is calculated according to the following formula:

$$T_{pc} = \frac{\sum_{i=1}^m t_{n_i}}{60 \cdot T_{sh} \cdot S} k_{br}$$

$T_{sh}$  - shift length (hours/shift)

$S$  - number of shifts

$k_{br}$  - coefficient of breaks in the shifts ( $k_{br} = 2-3$ )

**Cost of unit of finished goods** at this stage of calculation will be determined as follows:

$$C = \frac{g_n \cdot P_M}{k_m}$$

$k_m$  - coefficient of materials' weight in the cost of finished goods ( $k_m = 0,75 - 0,80$ )

**Coefficient of finished goods readiness:**

$$k_r = \frac{k_m + 1}{2}$$

## 2.8 Cost of Finished Goods

The cost of finished goods is calculated according to the following formula:

$$C_{FG} = \frac{Q_a \cdot C \cdot T_{fg}}{360}$$

$T_{fg}$  - length of finished goods turnover (days) (given in the input data section)

## 2.9 Accounts Receivable

Accounts receivable balance is calculated according to the following formula:

$$C_{AR} = \frac{Q_s \cdot T_{ar} \cdot k_{ar}}{360}$$

$Q_{sap}$  - approximate annual sales volume (rub./year)

$T_{ar}$  - length of accounts receivable turnover (days) (given in the input data section)

$k_{ar}$  - portion of finished goods sold via credit sales ( $k_{ar} = 0,3 - 0,5$ )

**Approximate annual sales volume** at this stage of calculation is determined according to the following formula:

$$Q_{sap} = C \cdot Q_a \cdot (1 + \rho/100)$$

$\rho$  - profit margin for finished goods ( $\rho = 13 - 15\%$ )

## 2.10 Cash and cash equivalents balance

For the normal functioning of the firm in the beginning, it is necessary to have a minimum balance of cash ( $C_C$ ). In the context of this course paper it will be 10% of the cost of material assets (materials, work in progress and finished goods).

## 2.11 Total current assets

Total current assets can be calculated according to the formula:

$$C_{CA} = C_{PM} + C_{WP} + C_{FG} + C_{AR} + C_C$$

## Section 3. Determining Equity Financing

Equity (E) of the firm is usually used to finance fixed assets and working capital ( $C_{WC}$ ), which may be expressed in the following formula.

$$E = C_{TE} + C_{AE} + C_{PT} + C_{INT} + C_{WC}$$

Working capital may be calculated as follows:

$$C_{WC} = C_{CA} - (C_{AP} + C_{STD})$$

$C_{CA}$  - total current assets

$C_{AP}$  - accounts payable balance

$C_{STD}$  - short-term debt

### 3.1 Accounts payable

Accounts payable include firm's liabilities (obligations) to suppliers of materials and energy, taxes payable, salaries payable etc. In the context of the course paper we will limit it to obligations to suppliers.

$$C_{AP} = \frac{g_n \cdot Q_a \cdot P_m}{360} T_{ap} \cdot k_{ap}$$

$T_{ap}$  - length of accounts payable turnover (days in accounts payable) (days) (given in the input data section)

$k_{ap}$  - portion of material purchases on credit ( $k_{ap} = 40 - 50\%$ )

### 3.2 Short-term debt

Short-term debt amount equals to cash balance

### 3.3 Number of shares

Total number of shares depends on the total equity needed and the nominal price of a share ( $P_{nsh}$ )

$$N_{sh} = \frac{E}{P_{nsh}}$$

Shares nominal price will be 100 – 200 rubles.

## Section 4. Initial budgeted balance sheet

Assets		Thousands of rubles	Liabilities and Equity		Thousands of rubles
<b>I.</b>	<b>Noncurrent Assets</b>		<b>III</b>	<b>Equity</b>	
1.1	Intangibles		3.1	Shareholders' equity	
1.2	Fixed assets, including		Number of common shares		
1.2.1	Equipment				
	– technological				
	– additional				
	– production tools				
	Total I			Total III	
<b>II</b>	<b>Current Assets</b>		<b>IV</b>	<b>Long-term liabilities</b>	–
2.1	Materials		<b>V</b>	<b>Short-term liabilities</b>	
2.2	Work in progress		5.1	Short-term debt	
2.3	Finished goods		5.2	Accounts payable	
2.4	Accounts receivable				
2.5	Cash				
	Total II			Total V	
	Total Assets			Total Liabilities and Equity	

## Section 5. Determining the number of employees

Number of employees is needed to calculate labor costs and evaluate productivity  
All employees can be divided into 3 categories

- Production workers
- Additional workers
- Administrative staff

### 5.1 Number of production workers

The number of production workers for each operation ( $N_i$ ) depends on the labor-intensiveness of those operations

$$N_i = \frac{t_{n_i} \cdot Q_a}{F_L \cdot 60}$$

$F_L$  - annual labor time fund (given in the input data section)

### 5.2 Number of additional workers

Additional workers include such employees as: warehouse keepers, loaders, etc. The number of additional workers is determined according to the work positions and service times. In this course paper we will assume that a company needs 1 warehouse keeper and 3 loaders per each warehouse and 1 supervisor position to oversee 10 workers.

### 5.3 Number of administrative staff

The number of administrative staff is determined according to the staff schedule, which is developed by the student. The staff schedule is a document, which presents the information about the structure of staff and salaries for each position.

Our business will need the following staff positions:

1. Director
2. Vice-director Sales
3. Chief Engineer
4. Accountant-economist
5. Secretary
6. etc.

## Section 6. Budgeting Cost of Goods Manufactured

Cost budgets are important documents which determine the effectiveness of the company. They are developed to evaluate total manufacturing costs for goods, which in its turn determine the overhead costs and profits of the company.

Cost of Goods Manufactured can be calculated in 2 ways:

1. by economic elements;
2. by cost line items (detail budgets).

In the context of this course paper we will first calculate cost of goods manufactured by cost items and then aggregate them into economic elements.

### 6.1 Detail Budgets

Detail budgets include:

1. Materials budget
2. Wastes budget



3. Materials less wastes budget
4. Production workers basic salary budget
5. Production workers additional salary budget
6. Social payments budget
7. Overhead budget

### 6.1.1 Materials Budget

It is calculated for total production volume ( $C_{MQ}$ ) and per unit of production ( $C_M$ )

1. Materials costs for total production volume  $C_{MQ} = g_n \cdot P_M \cdot Q_a$  (rubles per year)
2. Materials costs per unit of production  $C_M = g_n \cdot P_M$  (rubles per unit)

### 6.1.2 Wastes Budget

Wastes are calculated for total production volume ( $C_{WQ}$ ) and per unit of production ( $C_W$ )

1. Wastes costs for total production volume  $C_{WQ} = (g_n - g_{fg}) \cdot P_W \cdot Q_a$  (rubles per year)
2. Wastes costs per unit of production  $C_W = (g_n - g_{fg}) \cdot P_W$  (rubles per unit)

Where

$g_{fg}$  - net weight of finished good

$P_W$  - wastes selling price (10% of the materials price  $P_M$ )

### 6.1.3 Materials less wastes budget

It is calculated for total production volume ( $C_{MWQ}$ ) and per unit of production ( $C_{MW}$ )

1. Materials less wastes costs for total production volume  $C_{MWQ} = C_{MQ} - C_{WQ}$  (rubles per year)
2. Materials less wastes costs per unit of production  $C_{MW} = C_M - C_W$  (rubles per unit)

### 6.1.4 Production workers basic salary budget ( $C_{BS}$ )

This budgets takes into account payments for working time of production workers. It depends on the form and the system of salaries calculation. In this course paper we will use the task rate with bonus system of payments. According to this system basic salary (task rate part)  $C_{BS}$  per unit of production is calculated:

$$C_{BS} = \sum_{i=1}^m \frac{t_{n_i} \cdot r_{h1} \cdot k_{t_i}}{60} \cdot k_b \cdot k_{rg}$$

Where

$r_{h1}$  - hour labor rate for 1<sup>st</sup> grade in tariffs table (13 – 15 rubles per hour)

$k_{t_i}$  - tariff coefficient for each rate of work

$k_b$  - bonus coefficient (1,5)

$k_{rg}$  - regional coefficient (1,3)

Table 5. Rate of work coefficients

Rate of work	4	5	6	7	8
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$k_t$  - tariff coefficient                      1,91                      2,16                      2,44                      2,76                      3,12

Basic salary of production workers for annual production volume  $C_{BSQ}$

$$C_{BSQ} = C_{BS} \cdot Q_a$$

### 6.1.5 Production workers additional salary budget

It is calculated for total production volume ( $C_{ASQ}$ ) and per unit of production ( $C_{AS}$ )

$$C_{AS} = C_{BS} \cdot k_{AS}$$

$k_{AS}$  - coefficient of additional salary (10% – 15%)

$$C_{ASQ} = C_{AS} \cdot Q_a$$

### 6.1.6 Production workers social payments budget

Social payments include payment to the following social funds:

1. Pension fund – 22%
2. Medical insurance fund – 5,1%
3. Social insurance fund – 2,9%

Total social payments are 30% of basic salary and additional salary.

Social payments should be calculated for total production volume ( $C_{SPQ}$ ) and per unit of production

( $C_{SP}$ )

$$C_{SP} = (C_{BS} + C_{AS}) \cdot k_{SP}$$

$k_{SP}$  - rate of social payments

$$C_{SPQ} = (C_{BSQ} + C_{ASQ}) \cdot k_{SP}$$

$$C_{SPQ} = C_{SP} \cdot Q_a$$

The first six detail budgets are included in the direct costs. The distinguished trait of these budgets is that they can be directly related to produced goods and therefore can be calculated on total and on a per unit basis.

Other costs will be viewed as indirect cost, which will be related to the total volume of production. These include:

1. General production costs
2. General administrative expenses
3. Selling expenses

For small businesses these can be aggregated into overhead costs

### 6.1.7 Overhead costs

Overhead costs include:

1. Fixed assets amortization
2. Amortization of intangible assets
3. Rent on facilities
4. Allocations for repairs fund

5. Additional materials for equipment maintenance
6. Cost of energy (electrical power)
7. Tools depreciation (wear and tear)
8. Additional workers salary
9. Additional workers social payments
10. Staff salary
11. Staff social payments
12. Business trips expenses
13. Representative expenses
14. Advertizing expenses
15. Interest payments on loans
16. Other expenses

#### **6.1.7.1 Fixed assets amortization (depreciation) ( $C_{FAA}$ )**

The company uses straight-line method of depreciation for its fixed assets. The norm of amortization ( $A_{FA}$ ) is calculated based on the period of effective use of the assets ( $T_{FA}$ ). In this course paper we will assume that fixed assets are used for 5 years on average.

$$A_{FA} = \frac{100\%}{T_{FA}}$$

Fixed assets amortization is calculated:

$$C_{FAA} = C_{FA} \cdot A_{FA}$$

#### **6.1.7.2 Amortization of intangible assets ( $C_{IAA}$ )**

The company also uses straight-line method of depreciation for its intangible assets. Effective utilization of intangible assets in the company is 5 years average  $T_{IA}$ .

$$A_{IA} = \frac{100\%}{T_{IA}}$$

Intangible assets amortization is calculated:

$$C_{IAA} = C_{IA} \cdot A_{IA}$$

#### **6.1.7.3 Rent on facilities ( $C_{FR}$ )**

$$C_{FR} = S_F \cdot P_R \cdot 12$$

$S_F$  - building space (square meters)

$P_R$  - rent per square meter

#### **6.1.7.4 Allocations for repairs fund ( $C_{RF}$ )**

$$C_{RF} = (C_{TE} + C_{AE}) \cdot k_{RP}$$

$C_{TE}$  - cost of technological equipment

$C_{AE}$  - cost of additional equipment

$k_{RP}$  - coefficient of repairs (10 – 15%)

#### **6.1.7.5 Additional materials for equipment maintenance ( $C_{AM}$ )**

$$C_{AM} = (C_{TE} + C_{AE}) \cdot k_{AM}$$

$k_{AM}$  - coefficient of additional materials (3-5%)

### 6.1.7.6 Cost of power energy (electrical power) ( $C_{PE}$ )

$$C_{PE} = \sum_{i=1}^m EP_i \cdot F_{D_0} \cdot k_{L_i} \cdot k_0 \cdot k_{EP} \cdot P_E \cdot N_{PE_i}$$

$EP_i$  - electric drive power for each unit of equipment (kilowatts)

$F_{D_0}$  - annual time fund for equipment (hours per year)

$k_{L_i}$  - coefficient of equipment load for each operation (taken from 2.1)

$k_0$  - coefficient of time used for performing an operation (0,6)

$k_{EP}$  - coefficient of electric power use (0,7)

$P_E$  - price of electricity

$N_{PE_i}$  - number of units of production equipment

Electric drive power for each unit of equipment on each operation is given in the table below

Table 6. Electric drive power for operations

Operation	1	2	3	4	5	6
$EP_i$ (kWatts)	5	7	6	8	4	7

### 6.1.7.7 Tools depreciation (wear and tear) ( $C_{TD}$ )

$$C_{TD} = \sum_{i=1}^m \frac{t_{n_i} \cdot k_0 \cdot Q_a \cdot P_t}{T_d}$$

$P_t$  - average price per unit of tools (50 – 70 rubles)

$T_d$  - average durability of tools minutes per life time (300 minutes)

### 6.1.7.8 Additional workers salary

$$C_{AWS} = \sum_{i=1}^k C_{AWR_i} \cdot N_{AW_i} \cdot 12 \cdot k_{AWB} \cdot k_{rg}$$

$k$  - number of professions of additional workers

$C_{AWR_i}$  - Monthly tariff rate for each additional worker position

$N_{AW_i}$  - number of additional workers in each position

$k_{AWB}$  - bonus coefficient for additional workers (1,2 – 1,3)

$k_{rg}$  - regional coefficient (1,3)

Table 7. Tariffs coefficients

Rate	Tariff coefficient	Monthly tariff rate (rub)
1	1	4330
2	1,04	4503
3	1,09	4720

4	1,142	4945
5	1,268	5490
6	1,407	6092
7	1,546	6694
8	1,699	7357
9	1,866	8080
10	2,047	8864
11	2,242	9708
12	2,423	10492
13	2,618	11336
14	2,813	12180
15	3,036	13146
16	3,259	14111
17	3,51	15198
18	4,5	19485

Position	Rate of work
Warehouse keeper	5
Supervisor	8
Loaders	4

#### 6.1.7.9 Additional workers social payments ( $C_{AWSP}$ )

$$C_{AWSP} = C_{AWS} \cdot k_{SP}$$

$k_{SP}$  - rate of social payments (30%)

#### 6.1.7.10 Staff salary ( $C_{STS}$ )

$$C_{STS} = \sum_{i=1}^n C_{STR_i} \cdot N_{ST_i} \cdot 12 \cdot k_{rg}$$

$C_{STR_i}$  - Monthly staff salary for each position

$N_{ST_i}$  - number of staff employees for each position

#### 6.1.7.11 Staff social payments

$$C_{SP_{ST}} = C_{STS} \cdot k_{SP}$$

#### 6.1.7.12 Business trips expenses ( $C_{BT}$ )

$$C_{BT} = C_{STS} \cdot k_{BT}$$

$k_{BT}$  - coefficient of business trip expenses (10% of staff salaries fund)

#### 6.1.7.13 Representative expenses ( $C_{RE}$ )

$$C_{RE} = C_{STS} \cdot k_{RE}$$

$k_{RE}$  - coefficient of representative expenses (1% of staff salaries' fund)

#### 6.1.7.14 Advertizing expenses ( $C_{AEX}$ )

$$C_{AEX} = Q_S \cdot k_{AE}$$

$k_{AE}$  - coefficient of advertizing expenses ( 1% of Sales volume  $Q_S$  )

#### 6.1.7.15 Interest payments on short term debt ( $C_D$ )

Interest payments on debt are included in the cost of goods only up to Central Bank reinvestment rate, multiplied by 2 ( $r_{CG} = r_{CBR} \cdot 2$ ). Central Bank reinvestment rate is 8%.

Interest rate on short term debt for small business enterprises ( $r_D$ ) is 17-20%

$$C_I = C_{STD} \cdot r_{CG} \cdot \frac{n_{ST}}{12}$$

$C_{STD}$  - Short term debt amount (rubles)

$n_{ST}$  - period of short-term credit (2 months)

#### 6.1.7.16 Other expenses

Other expenses include outsourcing costs, telecommunication costs, bank charges and fees, stationary costs etc. In the course paper they will amount to 10 – 20% of the above total overhead costs

## 6.2 Summarized Detail Budgets (Costs Grouping)

Table 8. Summarized Detail Budgets

#	Cost items	Amount (thousands of rubles)	Including		Grouping costs by elements
			Fixed Costs	Variable costs	
1	Fixed assets amortization	X	X	–	Amortization
2	Amortization of intangible assets	X	X	–	Other expenses
3	Rent on facilities	X	X	–	Other expenses
4	Allocations for repairs fund	X	X	–	Other expenses
5	Additional materials for equipment maintenance	X	X	X	Material costs
6	Cost of power energy	X	–	X	Material costs
7	Tools depreciation	X	–	X	Material costs
8	Additional workers salary	X	X	–	Labor costs
9	Additional workers social payments	X	X	–	Insurance expenses
10	Staff salary	X	X	–	Labor costs
11	Staff social payments	X	X	–	Insurance expenses
12	Business trips expenses	X	X	–	Other expenses
13	Representative expenses	X	X	–	Other expenses
14	Advertizing expenses	X	X	–	Other expenses
15	Interest payments on short	X	X	–	Other expenses

	term debt				
16	Other expenses	X	X	–	Other expenses
	<b>Total</b>	X	X	X	

### Section 7. Cost of Goods Manufactured Budget

Cost of goods manufactured budget is developed for an annual production volume. It is presented according to:

- Cost line items
- Cost elements

#### 7.1 CoGM Budget according to cost line items

Table 9. CoGM Budget according to cost line items

#	Cost line items	Amount (thousands of rubles per year)	Weight (%)
1.	Materials	X	X
2.	Wasted for sale	X	X
3.	Materials less wastes	X	X
4.	Production workers basic salary	X	X
5.	Production workers additional salary	X	X
6.	Production workers social payments	X	X
7.	Overhead costs	X	100%

TODO

- Fill in the table of CoGM budget according to cost line items

#### 7.2 CoGM Budget according to cost line items and economic elements

Table 10. CoGM Budget according to cost line items and economic elements

#	Cost items	Cost elements (economic)					Amount
		Material	Labor	Social payments	Amortization	Other	
1	2	3	4	5	6	7	8
	Direct variable costs						
1	Materials less wastes	X					X
2	Production workers basic salary		X				X
3	Production workers additional salary		X				X
4	Production workers social payments			X			X
	Overhead costs						
1	Fixed assets amortization				X		X
2	Amortization of intangible assets					X	X
3	Rent on facilities					X	X
4	Allocations for repairs fund					X	X
5	Additional materials for equipment	X					X

	maintenance						
6	Cost of power energy	X					X
7	Tools depreciation	X					X
8	Additional workers salary		X				X
9	Additional workers social payments			X			X
10	Staff salary		X				X
11	Staff social payments			X			X
12	Business trips expenses					X	X
13	Representative expenses					X	X
14	Advertizing expenses					X	X
15	Interest payments on short term debt					X	X
16	Other expenses					X	X
	<b>Total</b>	X	X	X	X	X	X

TODO

- Fill in the table of CoGM budget according to cost line items and economic elements

### 7.3 CoGM Budget according to cost economic elements

Table 11. CoGM Budget according to cost economic elements

#	Cost elements	Amount (thousands of rubles per year)	Weight (%)
1.	Material costs	X	X
2.	Labor costs	X	X
3.	Social payments	X	X
4.	Amortization	X	X
5.	Other costs	X	100%

TODO

- Fill in the table of CoGM budget according to cost economic elements

## Section 8. Cost of Goods Manufactured Calculation

Now we will calculate the CoGM per unit of production. It will help us to define the minimum price for finished goods. Table 7.1. will be used for this calculation.

The first 6 cost line items are calculated on a per unit basis based on the method of 7.1.

Calculation of overhead costs on a per unit basis can be done in 3 ways:

### 1. One-product production conditions

$$C_{OV} = \frac{C_{OVQ}}{Q_a}$$

$C_{OVQ}$  - total overhead costs (thousands of rubles)

### 2. Multi-product production conditions

$$C_{OV} = k_{OV} \cdot C_{BS}$$



$k_{OV}$  - coefficient of overhead costs

$C_{BS}$  - basic salary of production workers per unit of production (rubles)

c

$C_{BSQ}$  - total basic salary of production workers (thousands of rubles)

### 3. Variable and fixed costs differentiation

$$C_{OV_{VAR}} = k_{OV_{VAR}} \cdot C_{BS}$$

$$C_{OV_{FIX}} = k_{OV_{FIX}} \cdot C_{BS}$$

$k_{OV_{VAR}}$  - coefficient of variable overhead costs

$k_{OV_{FIX}}$  - coefficient of fixed overhead costs

$$k_{OV_{VAR}} = \frac{C_{OV_{Q_{VAR}}}}{\sum C_{BSQ}}$$

$$k_{OV_{FIX}} = \frac{C_{OV_{Q_{FIX}}}}{\sum C_{BSQ}}$$

Table 12. Cost of Goods Manufactured PER UNIT calculation

#	Cost line items (rubles per unit)	Variants of calculation		
		1	2	3
1	Materials	X	X	X
2	Wasted for sale	X	X	X
3	Materials less wastes	X	X	X
4	Production workers basic salary	X	X	X
5	Production workers additional salary	X	X	X
6	Production workers social payments	X	X	X
7	Overhead costs	X	X	–
8	Variable Overhead costs	–	–	X
9	Total direct and variable overhead costs	–	–	X
10	Fixed overhead costs	–	–	X
11	Cost of Goods Manufactured PER UNIT	X	X	X

TODO

- Fill in the table of Goods Manufactured PER UNIT

### Section 9. Determining minimum price

Minimum price level is the price for finished goods which allows to generate profits sufficient to cover the given dividend yield. Minimum price can be calculated as follows:

$$P_{\min} = CoGM \left( 1 + \frac{\rho_{\min}}{100} \right)$$

$CoGM$  - cost of goods manufactured per unit (rubles per unit)

$\rho_{\min}$  - minimum profit margin (%)

## 9.1 Determining minimum profit margin

Minimum profit margin can be defined graphically. To do so we need to determine how dividend yield depends on the level of profit margin and the price.

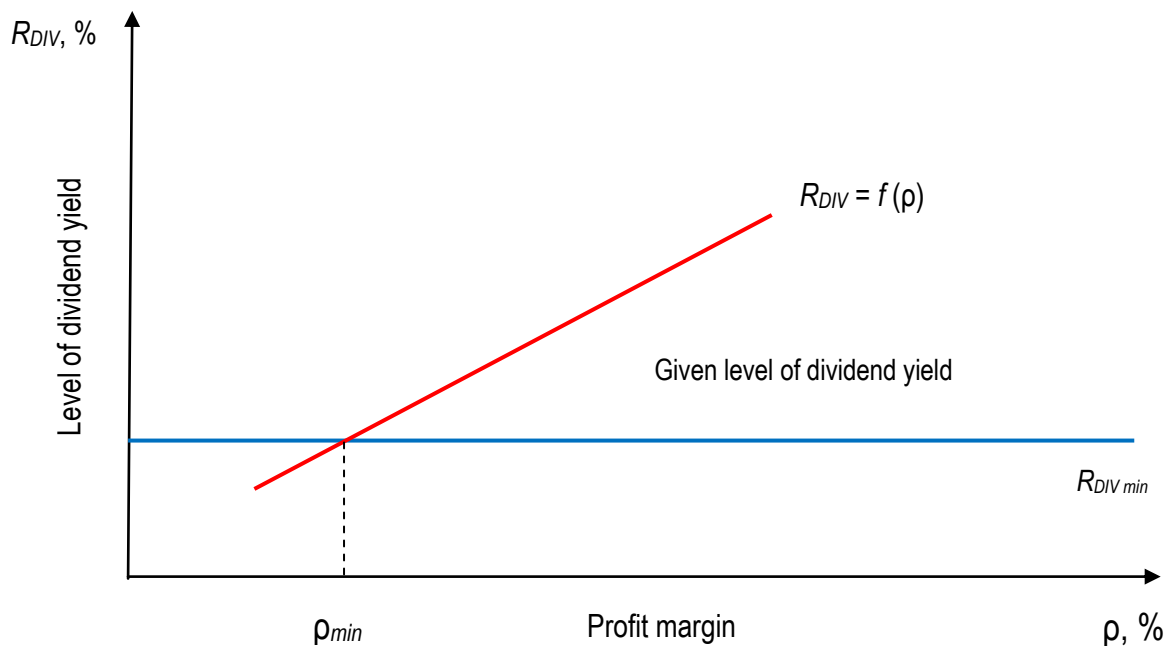


Figure 1. Relationship between the level of dividend yield and the profit margin

Minimum profit margin is determined graphically as the intersection of the two lines:

1. Line of the given level of dividend yield (is build based on the input data)
2. Line of the dividend yield as a function of the profit margin

The line of the dividend yield as a function of the profit margin is build according to the following algorithm:

**Step 1.** Two values of profit margin are suggested (e.g.  $\rho_1 = 20\%$ ;  $\rho_2 = 40\%$  )

**Step 2.** Prices for the given profit margin values are calculated according to the formula

$$P_i = CoGM \left( 1 + \frac{\rho_i}{100} \right)$$

**Step 3.** Sales volume ( $Q_s$  ) is calculated for the above given prices

$$Q_s = P \cdot Q_a$$

**Step 4.** Operating profit ( $OP$  ) is calculated

$$OP = (P - CoGM) \cdot Q_a$$

**Step 5.** Earnings before taxes ( $EBT$  ) is calculated by subtracting the property tax ( $T_p$  ) from the operating profit. Property tax rate is 2.2% of the Operating Profit.

$$EBT = OP - T_p$$

**Step 6.** Net profit ( $NP$  ) is calculated by subtracting the income tax ( $T_i$  ) from the operating profit.

Income tax is 20% of the  $EBT$  .

**Step 7.** Payment to reserve fund ( $F_{RES}$ ) from net profit is calculated, using the coefficient of reserve fund payments ( $k_{RF}$ ), which is 5%.

$$F_{RES} = k_{RF} \cdot NP$$

**Step 8.** Interest payments from net profit ( $C_{INP}$ ) are calculated. These payments are calculated similarly to 6.1.7.15. Reminder: Interest payment on debt are divided into two parts:

1. Interest payments included in the CoGM (only up to Central Bank reinvestment rate, multiplied by 2)
2. Interest payments from net profit (actual interest rate on short term debt for small business enterprises ( $r_D$ ) less Central Bank reinvestment rate, multiplied by 2 ( $r_{CG} = r_{CBR} \cdot 2$ ))

$$C_{INP} = C_{STD} \cdot (r_D - r_{CG}) \cdot \frac{n_{ST}}{12}$$

$C_{STD}$  - Short term debt amount (rubles)

$n_{ST}$  - period of short-term credit (2 months)

**Step 9.** Credit payment from net profit as a full principal paid ( $C_{STD}$ )

**Step 10.** Retained earnings ( $RE$ ) distribution. What is left after credit payment may be left as it is in the form of retained earnings, or it may be as well distributed for:

1. Savings fund ( $F_{SAV}$ ) 40% of retained earnings
2. Consumption fund ( $F_{CON}$ ) 30% of retained earnings
3. Dividends payments ( $C_{DP}$ ) 30% of retained earnings

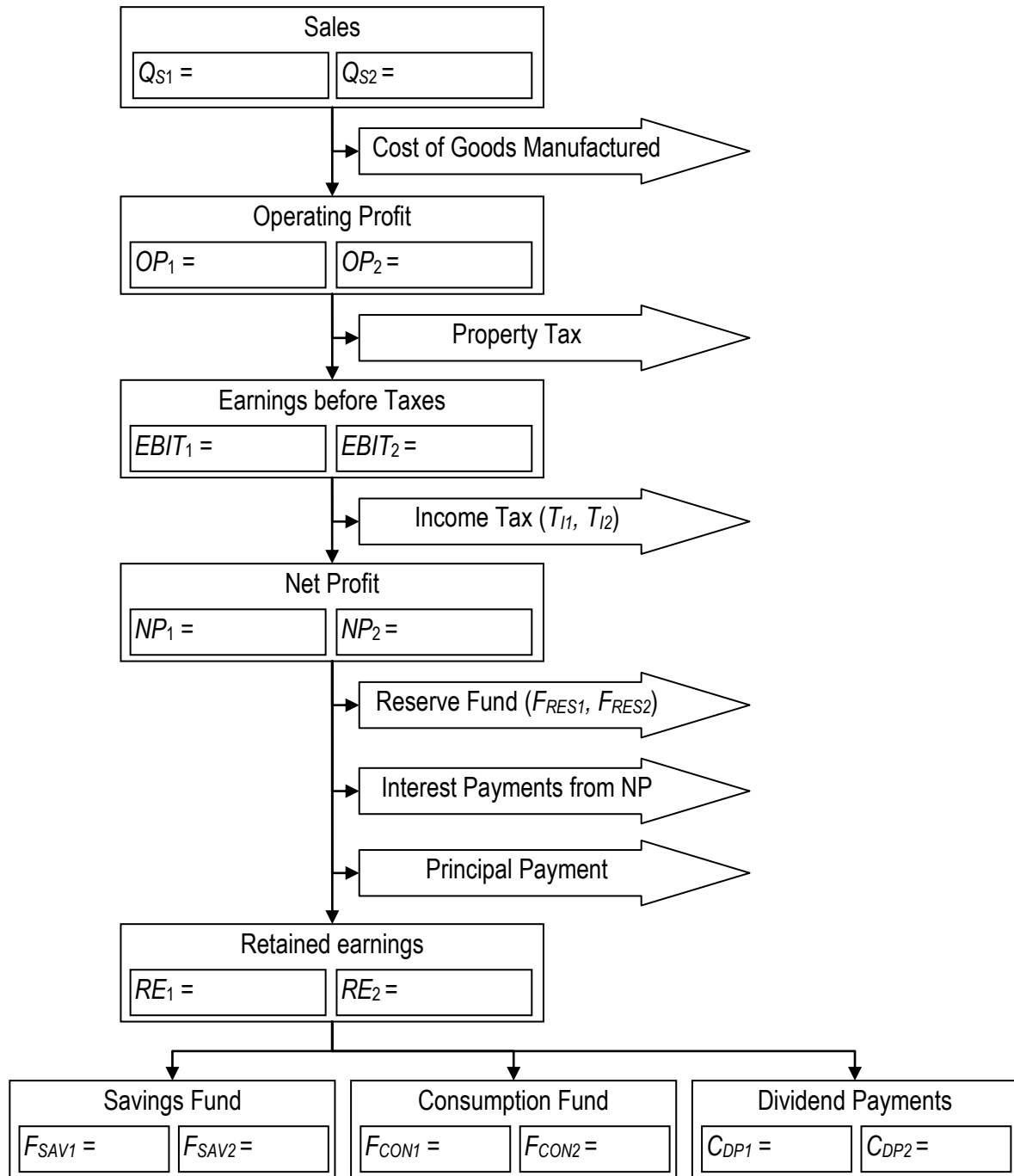


Figure 2. Scheme of profits distribution

**Step 11.** Dividend yield calculation. It is done in the following table

Table 13. Dividend yield calculation

#	Line item	Profit margin:	
		$\rho_1 = 20\%$	$\rho_2 = 40\%$
1	Dividend payments ( $C_{DP}$ )		
2	Number of shares ( $N_{SH}$ )		

3	Share nominal price ( $P_{NOM}$ )		
4	Dividends per share (rubles) $DPS = \frac{C_{DP}}{N_{SH}}$		
5	Dividend yield $r_{DIV} = \frac{DPS}{P_{NOM}}, \%$		

Now we are ready to build a line of dividend yield based on two dots  $A(\rho_1; r_{DIV1})$  and  $B(\rho_2; r_{DIV2})$   
Intersection of these two lines will give us minimum profit margin ( $\rho_{min}$ )

TODO

- Build both lines of the graph in Excel (in a separate tab)
- Calculate step by step  $\rho_{min}$ .

## 9.2 Determining Minimum Price Level

Minimum profit margin should end up being less than the average industry profit margin ( $\rho_{AV} = 15\%$ )

$$\rho_{min} < \rho_{AV}$$

Now we are ready to calculate the minimum price

$$P_{min} = CoGM \left( 1 + \frac{\rho_{min}}{100} \right)$$

TODO

- Calculate  $P_{min}$  for finished goods.

## 9.3 Determining Selling Price Level

Based on the minimum profit margin and average industry profit margin we have to decide our enterprise profit margin, which will define the selling price ( $P_s$ ) for finished goods

$$\rho_{min} < \rho_{ENT} \leq \rho_{AV}$$

In this course paper it may be 15%

TODO

- Calculate  $P_s$  for finished goods.

## 9.4 Determining Dividend Yield For The Selling Price

It is done according to the algorithm of figure 2 and table 13.

TODO

- Calculate  $r_{DIV}$  for the selling price.

## Section 10. Determining the Minimum Sales Volume and Financial Stability

### 10.1 Determining the Minimum Sales Volume

Minimum sales volume is the volume of sales which covers all company's expenses (fixed and variable costs), so that it generates no losses. It is also known as the breakeven point ( $Q_{BEP}$ ).

To calculate the breakeven point the following formula can be used:

$$Q_{BEP} = \frac{TFC}{P - VC}$$

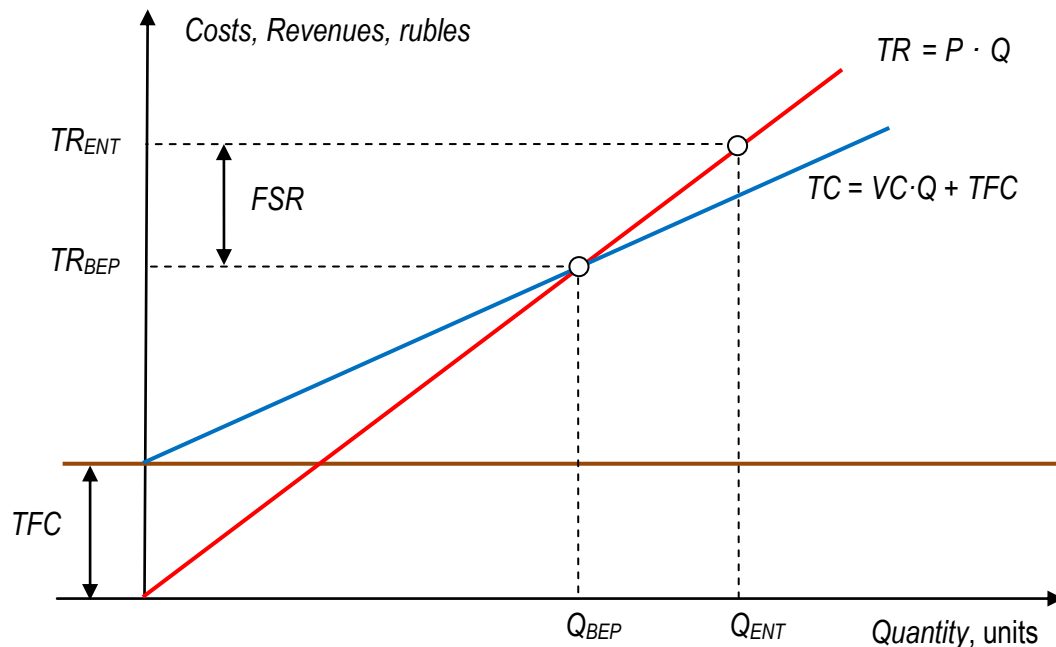


Figure 3. Breakeven analysis

$TR$  - total revenue (analog of  $Q_s$ ) in rubles

$TFC$  - total fixed cost (rubles)

$TC$  - total costs (rubles)

$Q_{BE}$  - breakeven quantity (units)

$TR_{BE}$  - sales at breakeven point (rubles)

$Q_{ENT}$  - planned annual quantity (units)

$TR_{ENT}$  - planned annual sales volume (rubles)

TODO:

- Plot the lines on the graph for  $TR$ ,  $TFC$ ,  $TC$  using the Excel (in a separate tab).
- Calculate the  $Q_{BEP}$  and the  $TR_{BE}$

## 10.2 Determining Financial Stability Reserve

Financial stability reserve ( $FSR$ ) of the company depends on how far it is above the breakeven point. The higher the  $TR$  is above the  $TR_{BE}$ , the higher is the financial stability reserve of the company, i.e. the lower is the risk of generating losses from the drop in sales.

Financial stability reserve may have an absolute (in rubles) and a relative (%) values.

$FSR = TR - TR_{BE}$  in rubles

$FSR = \frac{TR - TR_{BE}}{TR}$  in %.

## TODO

- Calculate the *FSR* in absolute and relative values.
- Write down your conclusions about financial stability of the business.





