TOPSIM®

LEARNING BUSINESS BY DOING BUSINESS

P TOPSIM – General Management

Participants' Manual – Part I Introduction

Version 13.1
Additional Scenario

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1 What is TOPSIM – General Management?

TOPSIM – General Management offers a challenging, computer-based management simulation. Together with your teammates you will form a business team that will take over the leadership of a company in the printing and copying industry. The simulation presents a realistic model of a company and provides participants the opportunity to:

- Learn quickly
- Learn in a risk-free way
- Gain practical experience with lasting, long-term effects

The management simulation is an interactive teaching and learning system based on the principle of:

LEARNING BUSINESS
BY DOING BUSINESS

The training objectives of TOPSIM – General Management

TOPSIM – General Management will help teach you to:

- Make better business decisions
- Gain experience thinking about the overall impact of your decisions
- Think more effectively about the links between different decision areas
- Define economic goals and strategies and implement them in a dynamic environment
- Understand the fundamentals of marketing
- Analyze financial figures and put insight into practice
- Learn to use business tools like cost accounting and income analysis
- Maintain control of a business under uncertain conditions
- Maintain overall control of difficult tasks
- Learn to think and act in an inter-disciplinary way
- Develop the ability to structure and solve problems
- Develop a view for the essential problems
- Practice effective communication through visualization
- Define and solve problems in teams with the aid of data-processed planning models

Course of the seminar

The business simulation TOPSIM – General Management is structured into two distinct phases: decision phases and evaluation phases. During **decision phases**, the participants have to make operations decisions for their company. During **evaluation phases**, the participants will have to analyze the results of the previous period and test their overall business strategy against current economic conditions. Usually, instructors will use the time in between these phases to either provide relevant background information to the participants or to offer a detailed evaluation of recent results and events from the simulation.

2 Introduction

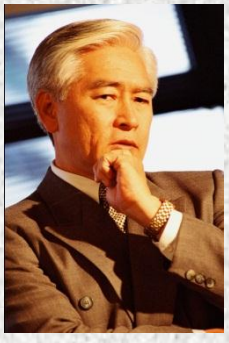
2.1 News Clipping from the *Daily Observer*

Business News

Turbulent Times at COPYFIX, Inc. – Executive Board facing replacement despite good performance – Chairman of the Board Mike Miller explains new strategy

In the past few weeks there have been a number of rumors in the business press that COPYFIX, Inc. would replace its Executive Board. Today, only a few days after the annual shareholders' meeting, those rumors were finally confirmed when the chairman of the Board of Directors announced the names of a new management team.

"Just looking at the facts, this change might come as a bit surprising", Mike Miller, chairman of the Board of Directors, stated. Based on COPYFIX's most recent financial results, one would definitely have to say that the past year was a success. COPYFIX's black and white copying machine, "COPY I", continues to be in high demand, and the company achieved an after tax profit of 7.13 million EUR in its most recent fiscal year (on revenues of 129 million and an operating result of 14.74 million EUR) Based on these numbers, the company's financial results and market share are roughly in line with those of its competitors.



This year, shareholders of COPYFIX, Inc. will receive a dividend equal to 30 % of total profit. Corporate equity amounts to 32.13 million EUR, while accruals for pensions amount to 11.86 million EUR and overall liabilities amount to 22.07 million EUR. COPYFIX's current operating cash flow of approx. 16.0 million EUR will most certainly provide a solid foundation for further additional growth.

Why then was the former Executive Board replaced? Miller states that "the former board was not able to present a satisfactory strategy for sustainable, long-term growth of COPYFIX, Inc. to the Board of Directors." Outdated manufacturing plants with poor ecology standards, a focus on just one distribution channel and a very conservative marketing mix are just a few of the points that raised questions about COPYFIX's long-term development. Several renowned industry experts have repeatedly criticized management for "a lack of vision and economic expertise". Most financial analysts also agreed with the above statement

According to Miller "this negative feedback from the analysts was a clear signal for us to act". The Board of Directors expects that the new management "will work hard to put COPYFIX, Inc. back on the path to sustainable growth." Only time will tell if management is able to fulfill these huge expectations.

2.2 The company

The following paragraphs give a brief introduction about the departments of COPYFIX, Inc.:

Sales

Marketing and sales people from the sales department provide customers and business partners with information and knowledge about our company and products. All customer requests related to sales are handled by this department.

Research & Development (R & D)

The R & D–department is the creative heart of our company. Together with leading scientists in the fields of document handling and scanning technology, we develop new products and improve the quality of our existing ones in order to better satisfy our customers' needs. All newly developed products are extensively tested to ensure that they meet internal quality standards.

Purchasing

The purchasing department procures all of the materials, parts and supply items needed for the production of our product "COPY I".

Production

The production department uses state-of-the-art production facilities to manufacture our high quality, black and white (b/w) photocopying machine "COPY I". Our highly qualified employees guarantee both the craftsmanship and durability of our "COPY I" product.

Human Resources (HR)

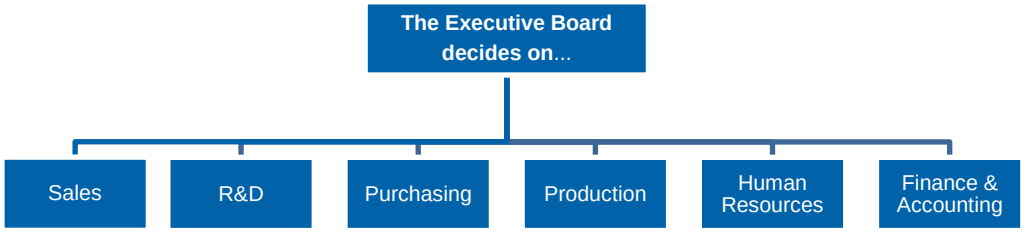
The HR-team focuses on everything related to our workforce, from staffing to general personnel support. In addition, the HR team is also responsible for planning and conducting internal training for all employees. Our employees are part of our competitive advantage!

Finance & Accounting

The accounting department monitors all numbers, data and facts related to COPYFIX, Inc. Our accounting team is well-versed in modern accounting and business practices, and helps to insure the financial success of our company.

3 Your decisions at COPYFIX, Inc.

In the simulation TOPSIM – General Management, your team will take over responsibility for COPYFIX, Inc. as the New Executive Board. As the newly elected Executive Board, you will have to make key decisions in all major fields of corporate activity:



The following description of different decision areas should help you to gain an overview of all decision parameters within the simulation, along with their corresponding impacts. The number and complexity of decisions will increase during the course of the seminar. Additionally, the decisions that you ultimately make will be highly dependent on the specific scenario conditions present in each period of the simulation.

3.1 Sales

3.1.1 Description of Product and Product Development

COPYFIX, Inc. manufactures and sells high-quality black and white (b/w) copying machines under the brand name “COPY I”. The product is characterized by the following features:

Product Specifications of „COPY I“			
Type	Desk model		
Copying speed	36 A4 copies per minute		
	18 A3 copies per minute		
Copy volume	1 - 99 copier per run		
Dimensions	W	L	H
	804 mm	664 mm	415 mm
Weight	80 kg		
Warm up time	Approximately 7 seconds		
Paper supply	2 cassettes of 500 sheets (A3, A4)		
Paper formats	Cassette A4 - A3		
	Sheet feeding A5 - A3		
Copying material	Paper cassette, single sheet feed		
	Transparency		
	Self-adhesive labels		

Product Specifications of „COPY I“	
Accessories	“Job interrupt”-key
	Self-diagnosis system
	Auto reset

Copiers are regularly examined by the consumer magazine *TechTest*, which evaluates all technological aspects related to the product. *TechTest's* evaluations are then quantified using the technology index. The technology index is determined based on copy speed, copy quality and ease of operation. Based on its current technological features, “COPY I” ranks as average in comparison to most other copy. In period 0, “COPY I” received the following evaluation:

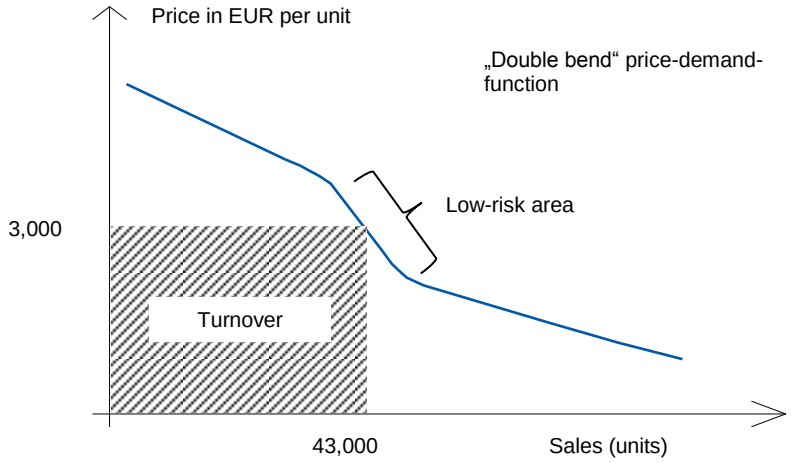
Technology index in period 0: 100.0

Evaluations from consumer magazines like *TechTest* are often used as guidelines by consumers. As a result, index values are viewed as important product attributes. Therefore, as the index for technology improve, market acceptance for COPY I will increase. In addition to the absolute value of the specific index, the relative difference between the value of your own indices and those of your competitors is also important. Improvements in technology can primarily be achieved by increasing investment in R & D (see point 3.2. research and development).

3.1.2 Pricing Policy

When competing with other copy machine suppliers, price is an important marketing lever that when changed, will have an almost immediate impact on sales. Therefore, pricing is an essential tool that can be used to differentiate your product from the competition. At the start of the game, the price of the machine on the domestic market (referred to as "market 1" in the reports) is set at 3,000 EUR.

The following relationship exists between price and sales volume:



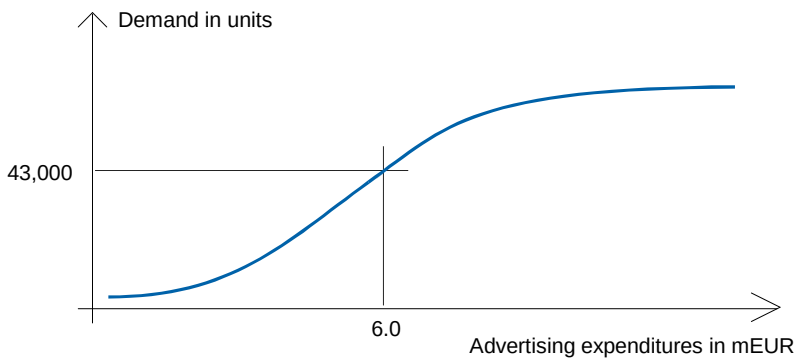
Market researchers believe (provided that all other variables remain constant) that demand can be expected to react to price as follows:

Price (EUR/unit)	Demand (units)
3,150 (+ 5%)	approx. 36,000
3,000 (period 0)	43,000 (period 0)
2,850 (− 5%)	> 55,000

3.1.3 Communication Policy

3.1.3.1 Advertising

Normally, advertising increasing advertising expenditures will also increase demand for your product. Advertising will have an effect over several periods, yet the most pronounced effect will occur in the period during which the advertising occurs. The effect of advertising on demand is illustrated in the following graph:



In the starting period, the initial advertising budget for market 1 is set at **6.00 mEUR**. As a benchmark, experts believe that an advertising expenditure of 7.00 mEUR would lead to total sales of approximately 45,000 units. However, once advertising expenditures have been doubled (to 12 mEUR or more), the incremental effect on demand will be negligible. The impact of advertising on demand will also be influenced by the difference between your company's budget and the budget of your competitors.

3.1.3.2 Corporate Identity and Corporate Image

An additional communication instrument that can be employed by the company to positively influence sales is your company's corporate identity (CI).

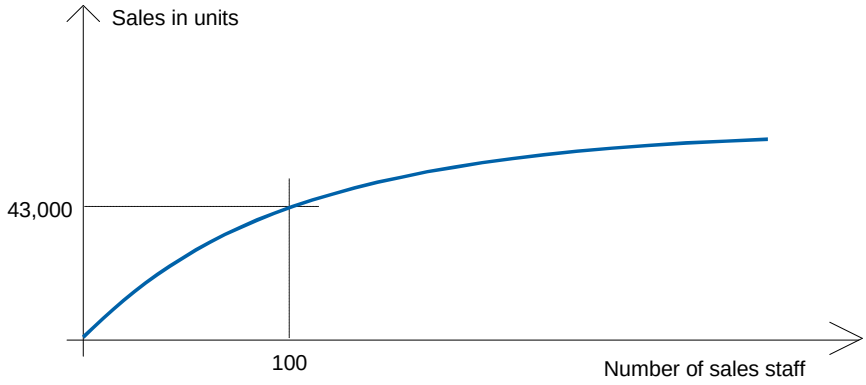
However, while a favorable corporate identity is definitely helpful, it may not be directly related to sales volume. Therefore, experts disagree as to whether it has any immediate effects. It is clear, however, that the company's corporate identity is an important factor in the long term development of the company and has a relatively long-lasting effect. For a company the size of COPYFIX, Inc., CI expenditures of approximately 3.00 mEUR are common in the industry. For planning the CI budget, you should also be aware of the diminishing marginal utility of your CI investments. In period 0, COPYFIX, Inc. invested 2.00 mEUR in CI.

CI expenditures influence will influence your overall corporate image significantly, however it's not the only influencing factor. Additional factors such as your company's environmental friendliness

will also impact your overall image. Every period, the overall corporate image of the company as viewed by the public is determined and recorded as the “corporate image” index.

3.1.4 Distribution Policy

In period 0 “COPY I” is sold to specialized retail traders on the domestic market (market 1) by a sales force of 100 employees. An increase in the utilization of personnel improves sales opportunities and has an effect over several periods. Experts predict that a sales force of 110 persons could increase sales up to approximately 45,000 units. Generally, the following relationship exists between the number of sales staff and the units sold:



Supplying copiers to specialized retail traders (market 1) involves packaging and transport costs of **25.00 EUR** per machine.
If the complexity of the product is high (high technology index), the purchasing process becomes more complicated, consequently additional employees in the purchasing department are hired.

3.1.4.1 Additional Sales Opportunities

In addition to selling to specialized retail traders, there are also some other opportunities available in the domestic market. For example, the company can supply private bulk buyers, and/or respond to requests for bids from public authorities.

Sales to Bulk buyers

All companies can sell to bulk buyers. Bulk buyers set a fixed price that they are will to pay and also indicate a maximum amount that they are willing to purchase (however, a smaller quantity can be supplied if necessary). The quantity required by the bulk buyer will be supplied in the current period and takes precedence over sales to retailers. No distribution costs are incurred when selling to bulk buyers. This distribution channel may be used to reduce inventory; however, contribution margins are usually lower in comparison to sales to retail stores.

Sales through requests for bids

When public authorities have a specific need for copying machines in large quantities, they request bids by stating the quantity that they require. Companies can respond to such requests by bidding. The bid may not exceed the quoted price on the domestic market (market 1). The company offering the lowest price will then be awarded the contract. Income from new sales and revenue from a successful bid in one period will be received in the following period. Furthermore, delivering for

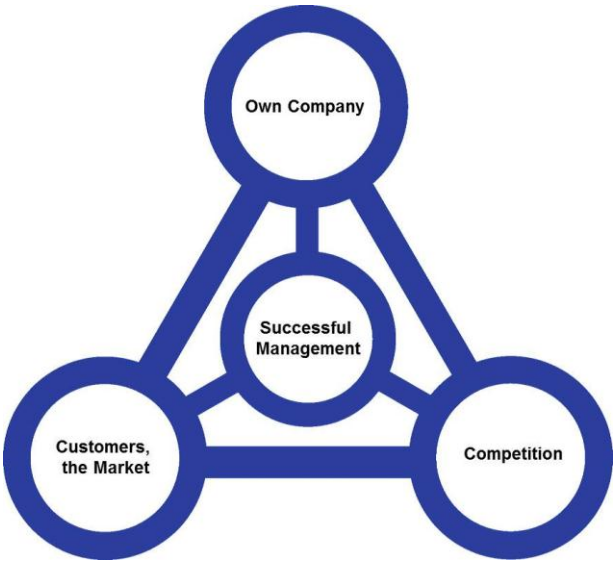
tendered bids takes priority over supplying retailers. In the event that two companies quote the same price, the company whose product possesses the better product attributes will receive the contract. There are no distribution costs associated with winning a bid.

3.1.5 Marketing-Mix

The final volume of "COPY I" that you can sell depends on a number of factors, but the main four factors that you can influence directly are referred to as "marketing instruments," or as the "Four Ps" (Product - Price - Place - Promotion). Your task is to find the best possible mix of these instruments (the so called "marketing mix"). Aspects of the marketing mix are:

4Ps	Marketing Instrument	Influencing factor
Product	Product Policy (Technology & Ecology)	Final number of R & D-employees Budget for external environmental counseling service
Price	Pricing Policy (Price)	Pricing decision
Place	Distribution Policy (Sales force)	Final number of sales personnel
Promotion	Communication Policy	Includes:
	• Advertising	• Investments in advertising
	• Corporate Identity	• Investments in corporate identity
	• Corporate Image	• Investments in corporate identity and improvement of ecological index by purchasing new machines and scrapping the old ones

Your marketing decisions should be determined based on both your overall strategy as well as the overall conditions of the market. Keep in mind that you will never be able to fully predict the actions of your competitors. Furthermore, pricing and competitive aggressiveness of your competitors will have an influence on your potential sales volume. This means that in certain circumstances, sales growth could actually be higher or lower that what is predicted in the economic news.


Own Company
Successful Management
Customers, the Market
Competition

3.1.6 Insufficient Capacity to Supply

"COPY I" is supplied in the following order:

1. Contracts resulting from requests for bids
2. Commitments to bulk buyers
3. Supply to retailers (market 1)
4. Supply to retailers (market 2)

If you create demand (due to your marketing mix) that your company is unable to satisfy, you will lose these sales due to your **insufficient supply capacity**. Approximately 80% of the demand that you are unable to meet in market 1 will then be distributed amongst the other companies in the simulation in proportion to their existing market shares. As a result of this distribution, one of the other companies might also face an inability to supply. In this case, the demand which was not satisfied by this company will not again be distributed to the rest of the companies. Therefore, it could be the case that less than 80% of the unsupplied demand is distributed to other companies.

3.1.7 Customer Satisfaction

Customer satisfaction also has an important (but difficult to measure) influence on demand. Experts state the following as factors of customer satisfaction:

Factor	Effect on customer satisfaction
Ability to supply in previous period	Inability to supply annoys consumers.
Price changes	Customers prefer constant or decreasing prices.
Price performance ratio	If the company's product is better than the product of its competitors, higher prices can be commanded without the risk of having dissatisfied customers.
Stock of old equipment	Customers always want the most recent and best-designed products. A large stock of old equipment may lead to dissatisfaction among customers.
Corporate Image	A positive corporate image encourages customer satisfaction.

Customer satisfaction is calculated per product for every market and is measured with an index displayed in Report 2. In period 0, the index is 100. High customer satisfaction leads to a high index value while a low index value means that customers are experiencing a lower level of satisfaction.

3.1.8 Market Research Report for the Industry

In order to obtain information on the marketing efforts of competitors, you may in any period purchase a market research report for **0.10 mEUR**. The market research report contains the following information:

No. 12 Market Research Report I

		Co.	Price	Adv.		Sales		Revenue		Product Indices
			EUR	mEUR	%	Units	%	mEUR	%	Techn.
Copy I	Market 1	1	3,000	6.00	20.0	43,000	20.0	129.0	20.0	100.0
		2	3,000	6.00	20.0	43,000	20.0	129.0	20.0	100.0
		3	3,000	6.00	20.0	43,000	20.0	129.0	20.0	100.0
		4	3,000	6.00	20.0	43,000	20.0	129.0	20.0	100.0
		5	3,000	6.00	20.0	43,000	20.0	129.0	20.0	100.0
		Ø / T	3,000	30.00	100.0	215,000	100.0	645.0	100.0	100.0

Other	Co.	Prod. Staff	Copy I	Production Lines			Expenses R & D	Sales
			O/R/N	Type A	Type B	Type C	(mEUR)	(No.of Ppl.)
	1	852	O	4	0	0	1.5	100
	2	852	O	4	0	0	1.5	100
	3	852	O	4	0	0	1.5	100
	4	852	O	4	0	0	1.5	100
	5	852	O	4	0	0	1.5	100

3.2 R & D

Companies must continuously improve their products in order to keep up with technological progress, increasing environmental awareness on the part of consumers, and growing pressure from competitors. To further develop “COPY I”, COPYFIX, Inc. can take the following measures:

1. Technology	
Measure	Staff recruitment in the area of R & D (expenses on employee salaries)
Result	Advance in technology → Technology index rises
Effect	• Market share increases • Rework costs rise due to higher technical standards (e.g. demand for precision, increased complexity)
2. Ecology	
Measure	Expenses for external consultancy services in the area of ecology
Result	Increase in environmental sustainability and reduction of operating costs → Ecology index rises
Effect	Market share increases
3. Value Analysis	
Measure	Expenses for external consultancy services in the area of value analysis
Result	Increase in efficiency → Value analysis index rises
Effects	• Consumption of materials decreases • Increased costs through rework • No influence on market share

Decisions for period 0:

Area	Decision	Index value
Technology	34 employees in R & D	100.0 (referring to the analysis of the consumer magazine *TechTest)*

Excerpt from the “Product Development” report 4 in period 0:

	TECHN. (mEUR) Period	Cum.	Index
Copy I – old	1.5	8.2	100.0

3.3 Purchasing

3.3.1 Demand and Price Conditions

For the production of one machine “COPY I”, **<u>one</u> unit of "input materials / parts"** must be employed per copier in period 0.

Value analysis reduces the required input material necessary for production (i.e. with a value analysis index of more than 100.0 less than one unit of input materials is needed per copier “COPY I”). The demand for input materials / parts is calculated as follows:

$$\textbf{Demand in units} = \frac{\text{Units of "COPY I" to be produced}}{\text{Value analysis index} * 100}$$

At the beginning of the simulation, you take over your precursors’ continuous procurement contract. It assures the automatic supply of your products with the needed amount of material. The cost for one unit of input materials/parts is **550 EUR**. Your supplier insists on being paid immediately, because of the low price he offers.

3.3.2 Inventory for Input Materials / Parts

The storage costs for input materials / parts are:

0.05 mEUR per 1,000 units of closing inventory

Due to the negotiated procurement conditions (Just-in-time delivery), storage of input materials/parts is not required.

INVENTORY
INPUT MATERIALS / PARTS

	Copy I Quantity (Units)	Inventory (EUR/Unit)	Inventory (mEUR)
Initial Inventory	0	0	0.00
+ Quantity from Supplier	40,000	550	22.00
- Quantity used in Production	40,000	550	22.00
= Final Inventory	**0**	**0**	**0.00**

3.3.3 Inventory for Finished Goods

The storage costs for the finished goods are:

0.10 mEUR per 1,000 units of closing inventory

Here is an excerpt from the inventory report:

INVENTORY
FINISHED PRODUCTS

	Copy I		
	Quantity	Inventory	
	(Units)	(EUR/Unit)	(mEUR)
Initial Inventory	10,000	1,950	19.50
+ Quantity produced	40,000	2,042	81.67
- Quantity distributed	43,000	2,023	87.00
= Final Inventory	**7,000**	**2,023**	**14.16**

The closing inventory in period 0 is 7,000 units, valued at a cost of production of 2.023 EUR per unit. This value results from calculation of initial inventory and receipt.

$$\frac{(19.50\ \text{mEUR} + 81.67\ \text{mEUR})}{(10{,}000\ \text{units} + 40{,}000\ \text{units})} = 2{,}023\ \text{EUR / unit}$$

3.4 Production

3.4.1 Production Lines at the Start of the Game

At present, COPYFIX, Inc. possesses four, type A production lines numbered 1 through 4. The following data applies to plants presently in use:

Production lines Type	Nr.	Normal capacity (Units)	Acquisition period	Acquisit. value (mEUR)	Remaining life (periods)	Depreciat. (mEUR/ Per)	Net book value (mEUR)	Other Fixed Costs (mEUR/ Per)	Environmental index
A	1	8.000	− 8	12,50	1	1,25	1,25	1,50	83,0
A	2	9.000	− 7	15,00	2	1,50	3,00	1,00	90,0
A	3	11.500	− 6	20,00	3	2,00	6,00	0,50	95,0
A	4	13.500	− 5	20,00	4	2,00	8,00	0,25	98,0
∑		42.000		67,50		6,75	18,25	3,25	∅ 91,5

Even though the production lines are of the same type, their capacities and the extent of damage they cause to the environment vary. The performance data described above will remain the same throughout the entire life of each machine.

Other fixed costs from the production lines include for example, inspection and insurance costs resulting from contracts.

Once production lines are depreciated, they may **still be utilized for production purposes**.

3.4.2 Production Capacity Required

<u>One</u> available unit of capacity is required to produce one “COPY I”. Capacity demand may be different for **new products**.

3.4.3 Options for adjusting Production Capacity

The available production capacity in a period can be influenced through the following means:

- Investments in new lines
- Disinvestment of old lines
- Maintenance
- Rationalization
- Overtime allotted to production lines

3.4.3.1 Investments in New Production Lines

For the production of “COPY I”, new production lines of Type A, B and / or C can be purchased. The current specifications of production line types are given below:

Production lines (Type)	Purchase price (mEUR)	Duration (periods)	Normal capacity (Units/ period)	Other FC (mEUR/ period)	Environmental index
A	20.00	10	14,000	0.3	100.0
B	25.00	10	18,000	2.0	105.0
C	30.00	15	22,000	2.5	110.0

A maximum of nine production lines may be purchased per type in addition to the four Type A production lines owned by the company at the beginning of the game. Newly acquired production lines are **immediately available for production use** in the period in which the order is made.

3.4.3.2 Disinvestments of Old Production Lines

Production lines can be disinvested (scrapped), and a production line that has been scrapped will be **no longer available at the start of the period** in question. A production line that has been scrapped will also be immediately depreciated. From the sale, your company will receive proceeds equal to a set percentage of the net book value. The amount of these proceeds can be found under "Other Expenditure". The percentage of net book value that you will receive when disinvesting each type of machine are as follows:

	Type A	Type B	Type C
Proceeds from scrap (residual revenue) as % of net book value	20.0	25.0	30.0

In one period a maximum of three production lines of the same type may be disinvested. In order to disinvest a certain production line, you are required to enter the **number of the line** in the decision form.

Effects of disinvestments		
Profit and Loss-Account (cost of sales method)		
Depreciation (Net book value)	=	Other expenditure
Residual revenue	=	Other income
Financial Report		
Residual revenue	=	Deposit from disinvestments

The accounts "other expenditure" and "other income" are reported together in the profit and loss statement.

3.4.3.3 Maintenance

Production lines are subject to constant wear and tear, which can result in reduced production capacity if not held in check. However, such problems can be avoided by performing regular production line maintenance. This also applies to newly acquired production lines.

The following figures describe the relationship between maintenance costs and the degree to which capacity is available. This relationship applies to all production lines.

Maintenance Costs per period and per production line in mEUR			Degree of capacity availability as % of normal capacity
Type A	**Type B**	**Type C**	
0.1	0.1	0.1	**50 %**
0.5	0.4	0.4	**70 %**
0.7	0.6	0.6	**80 %**
1.0	0.9	0.8	**95 %**
2.5	2.2	2.0	**97 %**
3.0	2.7	2.4	**99 %**
4.0	3.6	3.2	**100 %**

Normal capacity * Capacity availability = Available capacity I

In addition to the given values in the table, values in between can also be used for maintenance decisions. The minimum maintenance expenditure per production line is 0.1 mEUR. When no maintenance decisions are made, the maintenance will be executed automatically. The maintenance decision is valid for all production lines of one type.

3.4.3.4 Rationalization

The available production line capacity can be further increased through rationalization measures. These measures would upgrade and improve the productivity of your production lines. Rationalization can only be carried out **uniformly for all the production lines of one type**. The degree of rationalization achieved is expressed in terms of a rationalization factor and depends on the cumulative rationalization expenses since the acquisition of the respective production line. Newly acquired production lines have an initial rationalization factor of 1.00.

The entire rationalization expenditure from a period is claimed in the same period as the **costs**. The available capacity amount *after* rationalization is referred to as “Available capacity II”.

Available capacity I * Rationalization factor = Available capacity II

3.4.3.5 Overtime Allotted to Production Lines

Overtime can further increase Available Capacity II, but only up to **a maximum of 10%**, and the simulation will automatically schedule overtime when the planned production volume is higher than the available capacity. If overtime is necessary, then extra supervisory and operating costs (step-fixed costs) of **2.50 mEUR** will be incurred in the period. The available capacity amount *after* overtime is included is referred to as “Available capacity III”.

Available capacity II * Overtime factor = Available capacity III

3.4.4 Investments in Environmental Technology

Environmental regulators currently use a measure called the “environmental damage indicator” to measure the environmental impact of your company’s production. Due to the fact that your company hasn’t installed additional purification plants or filters *(end-of-pipe*-investments), your current environmental damage indicator is only average. However, if you choose to, it is possible for you to reduce the overall amount of environmental damage caused by your company.

The ecology index of the production lines themselves can only be improved through either the acquisition of new production lines or through the scrapping of old ones. If the environmental damage indicator drops below the legally required level of 100.0 (Index), then in the following period a penalty charge per missing index point must be paid to the Environmental Authority. Based on the values from period 0, 1.90 mEUR must be paid in period 1.

Environmental index of production lines (end of period 0)	Index	91.50
Penalty charge payable to authorities next period	mEUR	1.90

Investments in environmental technology like plants or filters *(end-of-pipe*-investments) can reduce the amount of environmental damage caused by the company. Any investment in environmental technology will be depreciated over 10 years using the straight-line method.

Your company's environmental damage indicator also has a direct influence on the following factors:

- Sales
- Absenteeism and motivation of production staff
- Corporate image
- Share price

3.4.5 Rework

Rework expenditures resulting from defective units arise during the production process. The amount of the necessary rework expenditure depends on the following factors:

Influencing factor	Effect on rework
Technology index	Higher technology leads to more rework as a result of the product’s increased complexity.
Value analysis index	Intensified value analysis increases expenditures on rework.
Level of non-salary staff costs	Higher non-salary staff costs lead to reduced rework (rejects) as a result of increased staff payment.
Motivation of staff	Highly motivated staff leads to reduced rework.

3.4.6 Factory Materials

In period 0, factory materials cost 50 EUR per “COPY I” manufactured. The factory materials are purchased automatically and are always readily available in the required amounts.

3.5 Personnel

3.5.1 Work Force at the Start of the Game

In period 0, staff and salary costs at COPYFIX, Inc. are allocated as follows:

Cost center	Final workforce	Salaries in period 0 in EUR without non-salary staff costs
Purchasing	18	30,000
Administration	202	28,000
Production	852	30,000
Research & Development	34	44,000
Marketing/Sales	100	40,000
Total	**1,206**	

The “Administration” cost center encompasses Human Resources Management, Finance and Accounting and General Administration.

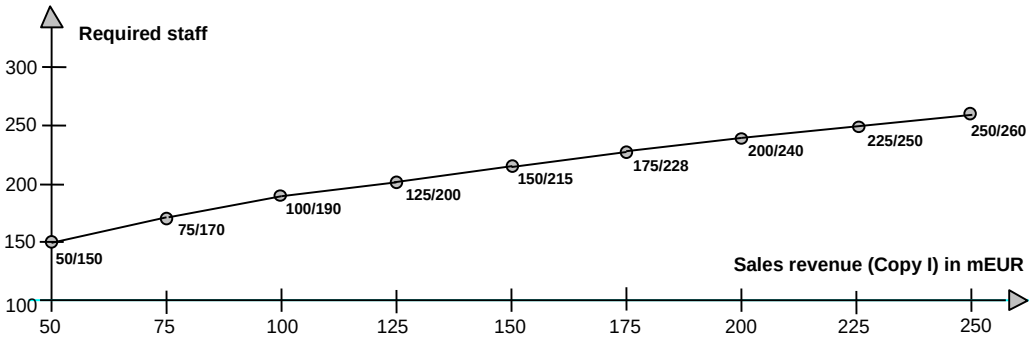
3.5.2 Hiring and Dismissal

Work force adjustment in the simulation is primarily accomplished through employee hiring and dismissal. However, the workforce within the company is also influenced by workers quitting **(attrition)**. The attrition rate depends mostly on the amount of **non-salary staff costs**.

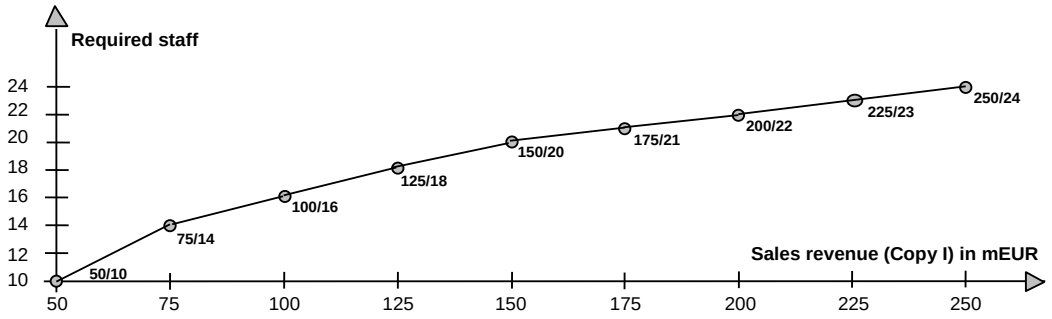
You may recruit and dismiss **Production** staff. In the case of **R & D** as well as in **Sales** you simply set a desired **final workforce level**. The simulation software will automatically **hire or dismiss** employees as it makes the necessary changes to the workforce (attrition is taken into consideration as well).

The number of employees in the areas of **purchasing** and **administration** depends on the company's sales revenue. If the sales revenue fluctuates, the number of necessary employees will be adjusted automatically by hiring and dismissing employees. In administration however, 2.50 mEUR in fixed personal costs apply per period regardless of the amount sales revenue.

Cost Center Administration: Required Staff Based on Sales Revenue ("COPY I"):



Cost Center Purchasing: Required Staff Based on Sales Revenue ("COPY I"):



Additional workers in purchase are needed when the product complexity is high (high technological index), because the acquisition processes are more complex.

Each time a cost center hires a new employee, it incurs one-time costs of 12,500 EUR. Additionally, each time an employee is removed from a cost center, the company incurs one-time costs of 10,000 EUR. In production, R&D, and sales, if more than 5 % of staff are displaced in a period, a work council (the simulation leader) can ask the company to install a social plan. Reshuffles within the area R&D (for example from COPY I to COPY II) and Sales (from market 1 to market 2) aren't seen as hires or removals. The possible amount of new hires can also be limited by potential shortages in the job market.

3.5.3 Non-Salary Staff Costs

In period 0, non-salary staff costs are equal to 40% of the respective wage and salary totals. A minimum rate of 37 % is legally required and includes things like the employer's contribution to social benefits, paid holidays, etc. Non-salary staff costs can be **increased at will**, but may only be reduced by **at most 3 %-points per period**.

Non-salary staff costs also have a direct influence on the **rate of attrition** as well as on **employee absenteeism.**

3.5.4 Employee Pension Plan

COPYFIX, Inc. has agreed to provide all employees with a pension plan. Therefore, in each period, COPYFIX must make pension contributions equal to **5%** of the total value of wages and salaries.

3.5.5 Production Staff Motivation

The production staff's level of motivation influences productivity and helps to reduce the amount of rework required. As a psychological factor, the level of staff motivation can be hard to control and sometimes changes very quickly.

At present the following factors are believed to effect staff motivation:

Influencing factors	Change in the influencing factor	Effect on motivation
Staff utilization	↗	?
Corporate image	↗	↗
Change in number of employees	↗	?
Non-salary staff costs	↗	↗
Pension reserve	↗	↗
Process optimization	↗	↘
Training	↗	↗
Quality of products	↗	↗

Staff utilization of about 98% is usually beneficial for the company in terms of maintaining or increasing the motivation of the staff. A well-managed growth rate will positively affect the rate of attrition. Quick growth or personnel reductions lead to a reduction of motivation.

Motivation is measured with an index. You can find the motivation index in the report on human resources (report 4). In period 0, the motivation index is 80. A higher / lower index value means a higher/lower level of motivation.

3.5.6 Personnel Report of Cost Centers

In each period you will receive the following table describing the workforce, staff changes, and personnel costs for the cost centers (here period 0):

STAFF BREAKDOWN BY DEPARTMENT (COST CENTER)

Number of People	Purchasing	Admin.	Production	R & D	Sales	Total
Initial Workforce	18	200	853	34	100	1,205
+ Hired	1	10	50	1	9	71
- Dismissed	0	0	0	0	0	0
- Attrition	1	8	51	1	9	70
= Final Workforce	**18**	**202**	**852**	**34**	**100**	**1,206**
in mEUR						
Wages & Salaries (1)	0.54	5.66	25.56	1.50	4.00	37.25
Turnover/Training	0.01	0.13	0.63	0.01	0.11	0.89
Non-sal. Staff Costs	0.22	2.26	10.22	0.60	1.60	14.90
Pension Reserve	0.03	0.28	1.28	0.07	0.20	1.86
Total staffing Costs	**0.80**	**8.33**	**37.69**	**2.18**	**5.91**	**54.90**
Non-salary Staff Costs as % of Wages & Salaries			40.0			
Motivation of Staff (Index):			80			

(1) Without Overtime Costs

3.5.7 Overtime of Production Staff

The **normal level of productivity** for an employee in production is **50 "COPY I" copiers** per period. Overtime is automatically scheduled when the planned production volume cannot be produced with the available number of staff (or with the available production capacity.) The percentage of **possible overtime is limited. Presently the limit is 10 %**.

If overtime is scheduled, whether caused by insufficient production staff or production lines or both, extra costs of **2.50 mEUR** per period are incurred for supervision and operation. Additionally, **25 % of wages and salaries** are paid to production staff as a result of overtime. (These additional premiums are not recorded in the personnel report).

3.5.8 Productivity

3.5.8.1 Process-Optimization Projects

With the help of process optimization projects the production processes can be rationalized, which leads in turn to increases in staff productivity. However, such projects can also lead to increases in absenteeism (a consequence to the higher imposition for the workers).

In **period 0**, the **process optimization index** is **1.00**. Consultants believe that an index of approximately 1.04 can be attained with an investment of 2.5 mEUR. If you do not invest in process-optimization, the reached value index will decrease by 0.01 points per period due to knowledge loss.

3.5.8.2 Training for Production Staff

Training for production staff improves the skills of employees and leads to increased productivity. Expenditures on training will also increase the staff competence index (**period 0 = 1.00**) and reduce absenteeism. When determining your training expenditure, think about the fact that the average cost for one training day per production worker is about 800 EUR. In line with industry standards, COPYFIX currently offers 2-4 training days per year per production worker. If no budget for training is allocated, the achieved training value index will decrease by 0.01 points per period due to knowledge loss.

3.5.8.3 Productivity Index I

On the one hand, the **Productivity Index I** is directly influenced by training and process optimization. On the other hand, the number of new hires and the corresponding amount of orientation time will usually lead to a decrease in average productivity. Additionally, employee motivation also has an impact on productivity.

Productivity index I is a function of 4 main factors: the process optimization index, the initial skill orientation index (adaptation index), the staff competence index, and the motivation index. This information is shown in report 3 (example below):

Process Optimization Index	1.00
* Adaptation	1.00
* Staff Competence Index	1.00
* Motivation Index	1.00
= Productivity Index I	**1.00**

3.5.8.4 Productivity Index II

As more units are produced, production workers gain more experience. This results in an increase in productivity. The cumulative amount of units produced over all periods counts toward this index. In other words, production workers have a learning curve, which is measured through **Productivity Index II. Productivity Index II starts 1.00 in the starting situation.**

3.5.8.5 Actual Productivity

Therefore, the actual productivity of an employee in production is:

Given productivity (in period 0: 50 COPY I units)

*** Productivity index I**

*** Productivity index II**

3.5.9 Absenteeism

Absenteeism reduces the number of staff that can be utilized in production. The following factors influence the rate of absenteeism:

Influencing factors	Measure for influencing factor	Effect on absenteeism
Staff motivation	↗	↘
Staff increase (Hirings)	↗	↗
Staff cuts (Dismissals)	↗	↘
Non-salary staff costs	↗	↘
Process optimization	↗	↗
Training	↗	↘
Environmental damage indicator	↗	↘

3.5.10 Production Staff Table

Excerpt from report 3 (values for period 0):

AVAILABILITY AND PRODUCTIVITY

Workforce	(No. of ppl.)	852
- Newly hired	6.2%	
- Loss from Absence	(No. of ppl.)	52
= Available Staff	(No. of ppl.)	800

3.6 Finance and Accounting

3.6.1 Customer Payment Patterns

80 % of the current period's sales revenue is paid in the current period,

20 % of the current period's sales revenue is paid in the following period.

These payment terms also pertain to bulk buyers and requests for tenders. Payment amounts to be received in the following period are shown in the current period's balance sheet under "Accounts receivable".

3.6.2 Financial Investment

In any period, COPYFIX can purchase **fixed income securities**, provided that the company has surplus liquidity at its disposal. Any interest earned will be credited to you in the current period. The securities themselves are automatically sold and paid for in the following period.

3.6.3 Rating

COPYFIX, Inc. is subject to a rating by its bank. A good rating will improve borrowing conditions, while a poor rating will lead to an increase in the interest rate on borrowed capital in the following period.

The most important influencing factors on the rating are listed as follows:

Influencing factor	Change in the influencing factor	Effect on rating
Equity ratio	↗	↗
Equity capital, absolute value	↗	↗
Free cash flow / debt	↗	↗
Overdraft loans	↗	↘
Customer satisfaction	↗	↗
Staff motivation	↗	↗
Operating cash flow / debt	↗	↗
Profit for a year	↗	↗
Planning quality	↗	↗
Staff productivity	↗	↗
Technology of products	↗	↗

The actual rating of COPYFIX, Inc. is average. It is displayed as a score measured by the number of points, and in period 0 the company has a rating of 100 points. Each period you can find the company's actual rating in report 8. If the rating changes, the borrowing conditions for the following period will also change.

3.6.4 Loans

3.6.4.1 Short-Term Loans

Depending on the company's needs, a short-term loan may be taken out in any period. The term of the loan is one period and the interest on this loan is paid in the current period (with the loan automatically being repaid in the following period). The interest rate is calculated based on the firm's amount of equity capital from the previous period. If the size of the loan exceeds the firm's amount of equity capital, a surcharge of 2 %-points is applied. If the size of the loan is above twice the

amount of equity capital, the surcharge is 4 %-points. The interest rate charged for short-term loans can also change based on the company's credit rating.

Note: The surcharge only applies to the fraction of the loan which surpasses the amount of equity capital or twice the amount of equity capital.

3.6.4.2 Long-Term Loans

You always have the option to replace short-term loans with long-term loans. Long-term loans have a ten-year term. **Long term loans offer a lower interest rate, but can also not be repaid prematurely.** The redemption takes place at the end of the loan duration. The interest rate on the loan is variable and is adjusted based on general interest rate developments. The interest rate on long-term loans can also change based on the company's rating.

3.6.4.3 Overdraft Loans

If in a certain period the company cannot cover all of its financial obligations, it will automatically be granted an overdraft loan so that it can avoid insolvency. The company's **cash balance** must amount to at least **0.10 mEUR at all times**. An overdraft loan will tie you over until a cash balance of 0.10 mEUR is achieved. The interest rate for the overdraft loan is **8.0 %** in period 0, and the interest is always due in the current period. The overdraft loan itself is repaid automatically in the following period.

3.6.5 Taxation

The company's tax burden is equivalent to **45 %** of:

Profit on ordinary activities
± extraordinary profit or loss.

Any losses will be carried forward and offset annual pre-tax profits until a positive balance (for which taxes must be paid) is attained. Tax payments occur in the current period.

3.6.6 Dividend Payments

In accordance with its charter, COPYFIX, Inc. must pay out as dividends each period at **least 30 %** of its annual after-tax profits. A higher payout however, will have a positive influence on the company's **share price**.

3.6.7 Share Price and Value of the Company

Each period, a new share price for the company is determined, reflecting the overall value of the company. The following factors have an influence on the share price:

Influencing factor	Change in the influencing factor	Effect on share price
Declared dividends for period	↗	↗
Equity capital for period	↗	↗
After-tax profit for period	↗	↗
Cumulative expenses for marketing mix	↗	↗
Cumulatively declared dividends	↗	↗
Planning quality	↗	↗
Return on sales	↗	↗
Sales compared with competitors	↗	↗
Corporate image	↗	↗
Environmental damage indicator	↗	↗
Debt-equity ratio	↗	↘

3.6.8 Shareholder Earnings

The shareholders of COPYFIX, Inc. evaluate the value of their shares in terms of how much their shares have contributed towards increasing their personal assets (for example, through dividends paid out or increases in share price). Gains from dividends paid and share price increases are recorded as shareholder earnings in the ratios of the company (report 14: Industry Business Reports).

3.6.9 Business Report on the Industry

Every period, you will receive a statement with the most important figures from your profit and loss accounts. Additionally, you will also receive information on the balance sheets of your competitors. Each of these reports comes free of charge from a business reporting service.

3.6.10 Accounting

COPYFIX, Inc. has a modern accounting department, which was set up to ensure that comparisons within your industry would be possible. The company's managerial accounting department performs the important function of planning and controlling costs through cost type accounting, cost center accounting (departmental costing), and unit-of-output costing. The financial accounting department ensures that the company complies with legal requirements and produces statements that report on the financial situation of the company. With the help of a profit-contribution-margin analysis, the operating results can be calculated. The available reports can be found in part II of the participant's manual. For analyzing cost center reports the following information is of interest:

Depreciation for buildings

The depreciation amount per period for buildings is **0.25 mEUR**. This depreciation amount is allocated to the cost centers as follows:

Purchasing	Production	R & D	Sales	Administration
5 %	70 %	5 %	5 %	15 %

Maintenance in administration

The machinery in the administration department (copiers, computers etc.) must also be maintained so that they continue to function properly. Fixed maintenance contracts cost **1.00 mEUR per period.**

Administration costs

The wages and salaries from administration are allocated to the “Administration” cost center (**as overhead**). These costs are then allocated to the products based on their share of revenue.