



*Learning business by doing business*



**TOPSIM-Planspiele**

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# **TOPSIM – Project Management**

**Participants` Manual**

Part I a

Version 2.5

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## **1. Foreword**

### **1.1 What is TOPSIM - Project Management?**

TOPSIM - Project Management is a management simulation which builds a bridge between business theory and practice. The management simulation represents a realistic model for project planning and development within a company. It offers participants quick, risk-free practical experience with lasting effects.

The management simulation is an interactive teaching and learning method (e.g. active learning), otherwise known as:

**Learning business  
by doing business**

### **1.2 The Learning Objectives of TOPSIM - Project Management**

- ⇒ Learning the primary responsibilities of a project manager
- ⇒ Identifying organizational requirements for successful project management
- ⇒ Recognizing the possibilities and boundaries in project management and becoming sensitive to the effects of one's decisions
- ⇒ Exposure to selected methods and instruments through practice exercise
- ⇒ Gaining exposure to complex decision making situations in uncertain conditions
- ⇒ Maintaining control in difficult situations
- ⇒ Developing a sense of the overall-picture as well as for the details
- ⇒ Learning to structure and solve problems
- ⇒ Practicing effective communication through visualization
- ⇒ Making decisions in teams with a PC-supported planning model

# **TOPSIM - Project Management**

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## **Introduction**



**We welcome you  
as the new project management team  
of Hypermax Inc. !**

## 2. Introduction

### 2.1 Black Forest News / Business Section

#### ***New amusement park – plans for a sensational roller coaster***

The investment firm **Family-Fun Inc.** is planning a spectacular amusement park with the Black Forest municipality. The main attraction of this amusement park will be a roller coaster (Hypercoaster). It will not only be the highest, but also the longest in Europe with a distance of one kilometre. For the first time ever, passengers will accelerate at 4Gs within 3.0 seconds to a speed of 130 kilometres per hour. Technological frontiers will be pushed by the roller coaster's more than 90° angle track. Another cutting edge development is the 4D sound system which will

be built into the roller coaster car and the track as requested by the investors.

The press has revealed a preliminary design of the Hypercoaster, which will bear the name "Rocket-Star". Family-Fun Inc anticipates great interest in the tender process.

Due to the high technical requirements of the equipment, the Black Forest company, Hypermax Inc. has a good chance at winning the contract to build the roller coaster. Hypermax has extensive experience in building hyper coaster equipment.



### 3. The Company: Hypermax Inc. - Description

#### 3.1 Service Offering

Hypermax Inc. plans, produces, and mounts roller coasters, machinery, and conveyor equipment according to customer requirements. Typical orders besides roller coasters include cranes, escalators, elevators, assembly lines and loading equipment. The competitiveness of the company results from short delivery times and on site servicing and maintenance.

Revenue from last year amounted to 280 million Euros and the company employs approximately 1000 employees. Exports account for 70% of revenues with each order averaging approximately 10 million Euros.

Due to the success of roller coasters in previous years, the Executive Board wishes to focus on the expansion of this business segment.

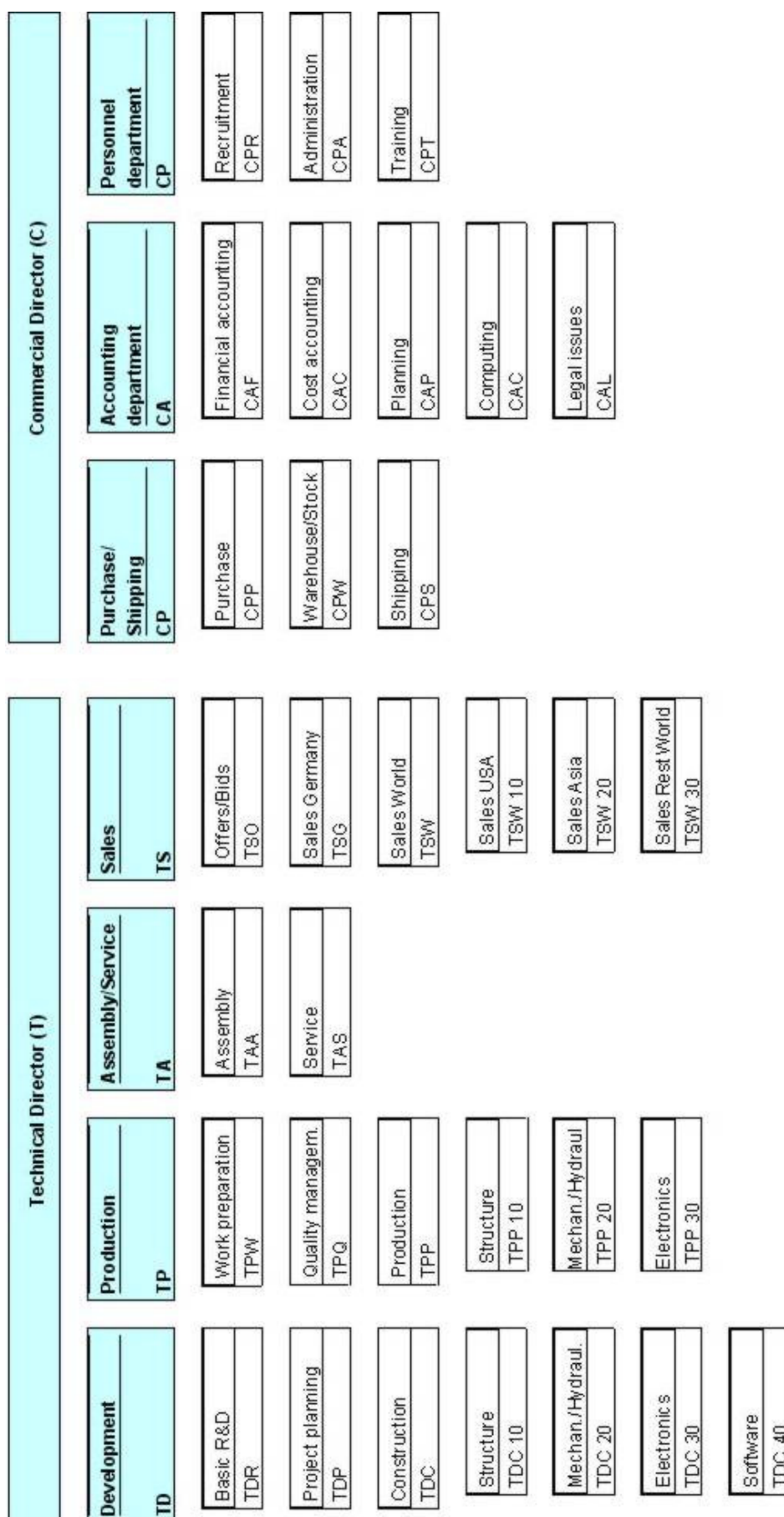
Newly delivered South European equipment is pictured below.



Hypermax Inc. has been successful in the roller coaster market, but it has numerous internal problems resulting in lower profits.

### 3.2

### Organizational Structure of the Company



### **3.3 The Processing of Previous Customer Orders: Problem Analysis and Method of Resolution**

#### **3.3.1 Description of the Starting Situation**

Up to now the processing of orders has been done as follows:

- Business is generated by making the company's service offering available to customers. Business can also result from responding to calls for tenders.
- The Bid Proposal manager (TSO) works together with the departments responsible for Project Planning (TDP), Work Preparation (TPW), Planning (CAP) and Legal issues (CAL).
- An order is assigned according to the sub-assembly groups "Structure", "Mechanics/Hydraulics" and "Electronics" and are completed by the following departments: Development (TD), Production (TP) and Assembly/Service (TA).
- At the preparation stage, the timeline, materials, and capacity requirements of an order are planned by the work preparation team (TPW).
- The assembly of equipment takes place on site with company technicians (TAA) and service personnel.

#### **3.3.2 Weaknesses and Conflict Areas**

Several problems have accumulated in the past years. Internal surveys analyzing the situation have revealed the following areas which are prone to problems.

- An increasing number of projects which are generating losses.
- Customers are frequently dissatisfied with the progress and results of projects.
- Pre-determined delivery dates are not met.
- Costs incurred significantly exceed planned costs.
- Customers are promised technical features which are not realistic.
- None of the departments take responsibility for the end result.
- Inter-department communication is ineffective.
- Internal discussions do not bring about required results.
- Departments do not share their expenditure data.
- The current operating situation is difficult to ascertain at any given time.
- Constant technical changes take place in the various departments.
- The purchasing division does not react in time and delivers too late.
- Acceptance specifications and test procedures are not clear.
- Many issues in the customer contracts are not clear.
- Various departments are unsatisfied because they are not allowed to develop new technologies within the framework of their projects.



### 3.3.3 The Role of Individual Project Managers

Approximately six months ago the Executive Board decided, with immediate effect, to select Project Managers (PM) for future projects.

- The project managers were fully responsible for project development and project results.
- Respective work statements outlined the project's scope and the result which would be delivered to the customer on the agreed date.
- Internally within the company, project managers were responsible for adhering to the pre-determined budgets for the individual project parts (work packages).

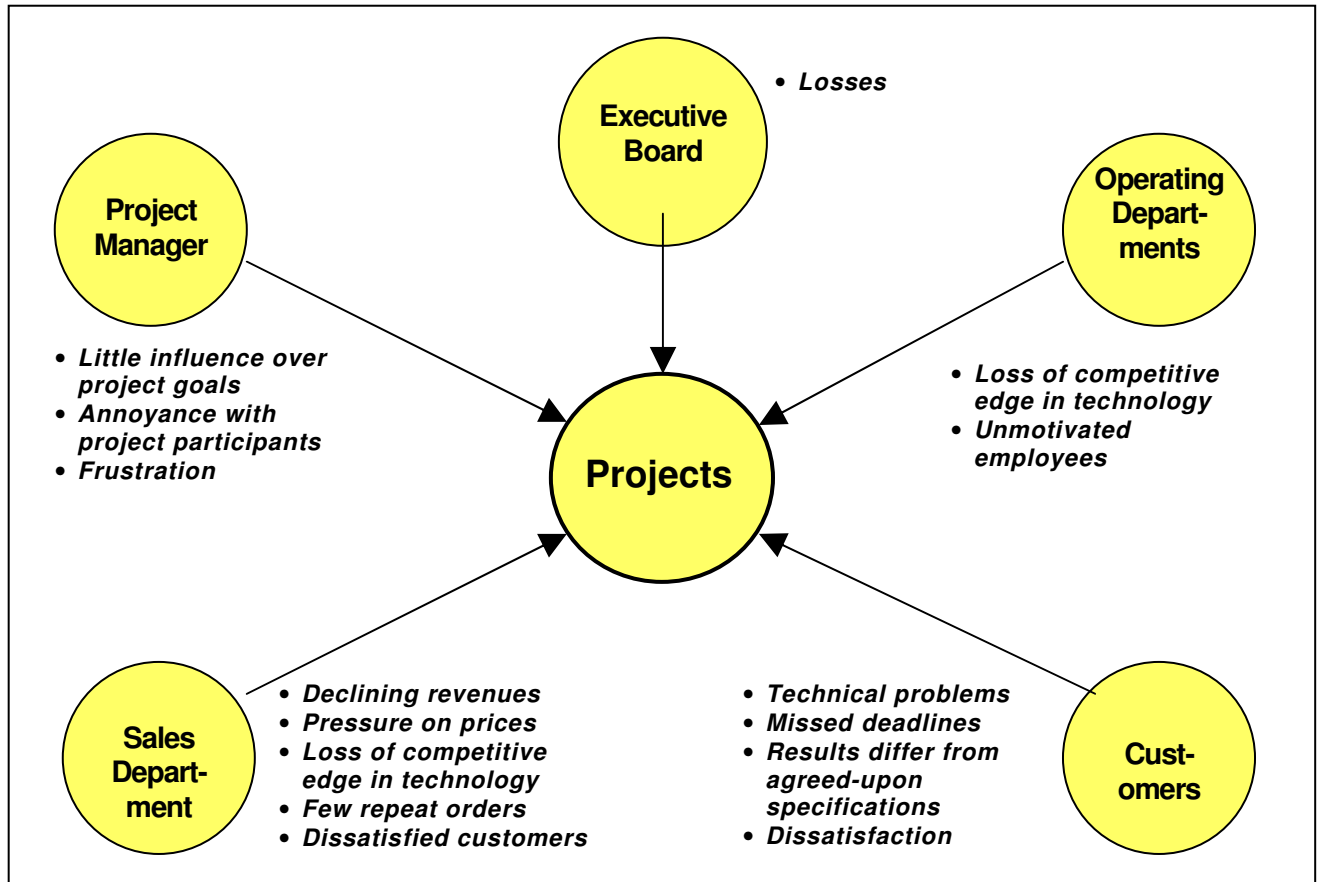
After some months, losses from projects were even higher than before with no end in sight.

Customers were dissatisfied and the projects were not earning enough revenue to cover costs. Department heads complained about the lack of motivation among employees. They could no longer develop or produce new and ground-breaking technologies as they did before, and the project manager constantly interfered with their work.

Project managers on the other hand complained about their lack of acceptance and ability to implement changes.

The Executive Board decided to analyze the situation as a **holistic and interrelated** problem. External consultants were assigned as moderators to guide the process of analysis.

### 3.4 Problems from the Perspective of Stakeholders



#### Feelings and attitudes among the people involved?

Who To Whom	Executive Board	Operating Departments	Sales Department	Project Managers	Customers
Executive Board	<ul style="list-style-type: none"> <li>• Falling prices</li> <li>• Rising costs</li> </ul>	<ul style="list-style-type: none"> <li>• Too opinionated</li> <li>• Too high costs</li> <li>• To many untried technologies</li> </ul>	<ul style="list-style-type: none"> <li>• They sell at unprofitable prices</li> <li>• Too technology-focused</li> </ul>	<ul style="list-style-type: none"> <li>• Ineffective</li> </ul>	<ul style="list-style-type: none"> <li>• They constantly demand more for the same amount of money.</li> </ul>
Operating Departments	<ul style="list-style-type: none"> <li>• They do not know what they want.</li> </ul>	<ul style="list-style-type: none"> <li>• We are not allowed to be innovative.</li> </ul>	<ul style="list-style-type: none"> <li>• They do not bring in enough business.</li> </ul>	<ul style="list-style-type: none"> <li>• Interfering know-it-alls</li> </ul>	<ul style="list-style-type: none"> <li>• They do not understand the technology</li> </ul>
Sales Department	<ul style="list-style-type: none"> <li>• Price reductions for initial projects are necessary</li> </ul>	<ul style="list-style-type: none"> <li>• They do what they want.</li> </ul>	<ul style="list-style-type: none"> <li>• Too little personnel</li> </ul>	<ul style="list-style-type: none"> <li>• They confuse the customers.</li> </ul>	<ul style="list-style-type: none"> <li>• They demand the impossible.</li> </ul>
Project Managers	<ul style="list-style-type: none"> <li>• No support</li> <li>• No decisions</li> </ul>	<ul style="list-style-type: none"> <li>• They do not stick to guidelines.</li> <li>• No information</li> </ul>	<ul style="list-style-type: none"> <li>• Inaccurate work statements are delivered</li> </ul>	<ul style="list-style-type: none"> <li>• No competence</li> <li>• No preparation</li> </ul>	<ul style="list-style-type: none"> <li>• Too rigid on with their requirements</li> </ul>
Customers	<ul style="list-style-type: none"> <li>• Nice people who are quick to compromise</li> </ul>	<ul style="list-style-type: none"> <li>• They make changes for no reason.</li> </ul>	<ul style="list-style-type: none"> <li>• They promise too much.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge about the project</li> </ul>	<ul style="list-style-type: none"> <li>• Too little knowledge of the technology involved</li> </ul>

### 3.5 Definition of Goals (as Influencing Factors)

Analysis of the foregoing problems resulted in the production of the following three goals:

- |                |   |
|----------------|---|
| <b>Goal 1:</b> | <b>Profits</b><br>Gain profits to ensure the company's survival.  |
| <b>Goal 2:</b> | <b>Customer Satisfaction</b><br>Maximize customer satisfaction to encourage repeat orders and referrals to potential customers. |
| <b>Goal 3:</b> | <b>Technological Edge</b><br>Purposefully develop and maintain a technological edge.  |

### 3.6 Relevant Influencing Factors

The following system-relevant factors were determined by brainstorming and systematic questioning of the stakeholders.

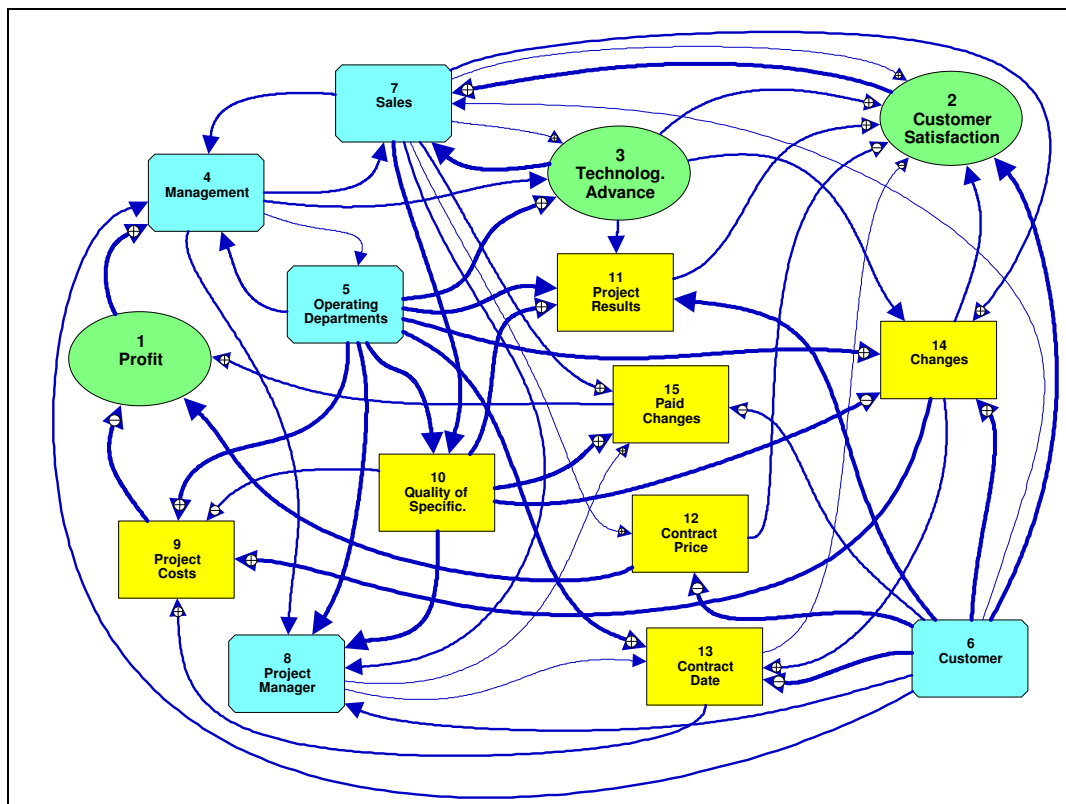
- **Executive Board**
- **Operating Departments**
- **Customers**
- **Sales**
- **Project Managers**
- **Quality of Tender Specifications**
- **Project Costs**
- **Project Results**
- **Contract Prices**
- **Contract Deadlines**
- **Changes**
- **Paid Changes**

### 3.7 Categorization of System-Relevant Influencing Factors

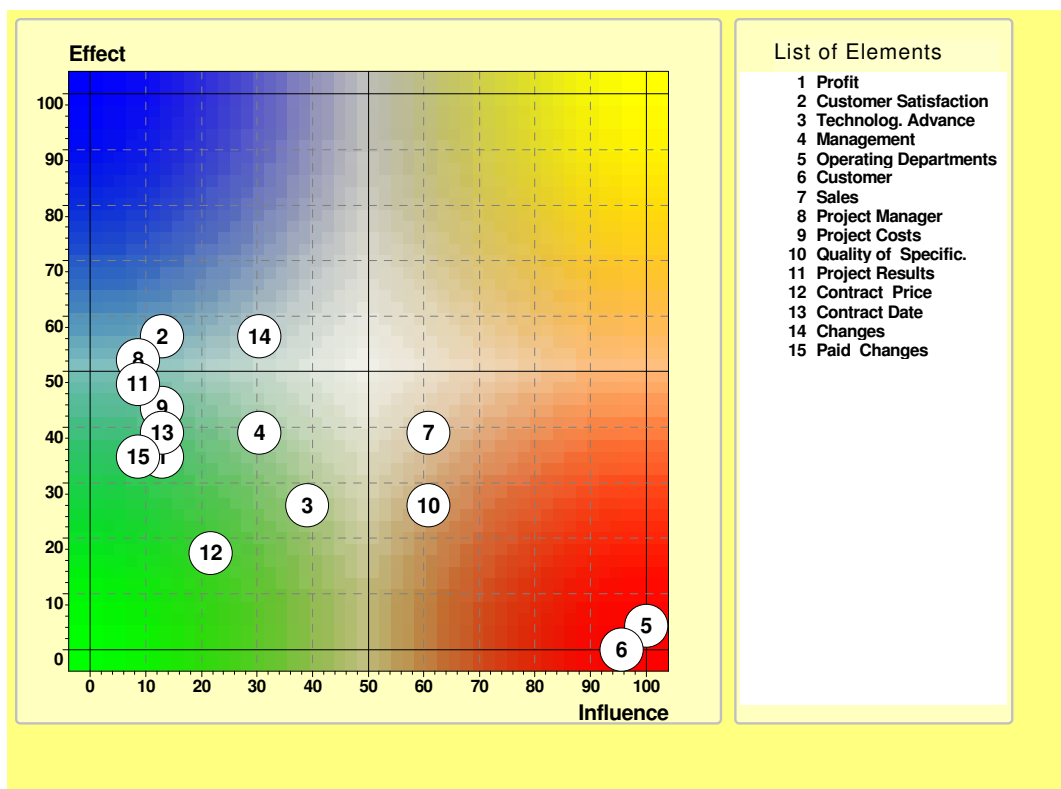
Influencing Factors	Category
1. Profit	<b>Goals</b>
2. Customer Satisfaction	
3. Technological Edge	
4. Executive Board	Influential groups: -people -institutions <b>Stakeholders</b>
5. Operating Departments	
6. Customers	
7. Sales	
8. Project Managers	
9. Project Costs	Other Factors of Influence: <b>Variables</b>
10. Quality of tender specifications	
11. Project Results	
12. Contract Prices	
13. Contract Deadlines	
14. Changes	
15. Paid Changes	

### 3.8 New Analysis of the Situation through a Networked Thinking Method

#### 3.8.1 The Influencing Factors in the Interconnected Network



#### 3.8.2 Influence Analysis (the "Balance of Power" in the Network)




### 3.8.3 Result

The analysis reveals that **operating departments have too much influence**, which substantially affects the economic results of the company. Project managers have had insignificant roles and very little influence.

## 3.9 Project: The Introduction of the Project Process

Effective and efficient organization of projects is required to improve the situation and a defined project management system should be introduced. To address this objective a specific project was created.

### 3.9.1 The Objectives of the Project

- Establishment of the organizational structure and introduction of an efficient project management system within 12 months of commencing the project.
- The project management system must meet the following requirements:
  - Use of only simple, proven, easy to learn, and practical project management instruments and methods.
  - **Decreases of 20% in order turn around time** 
  - A **15% reduction in the total** costs of an order.
  - Clarity in tender **acceptance requirements** and competence in the execution of jobs.

### 3.9.2 Success Factors during the Execution of the Project

The external consultants identified the following conditions (to the Executive Board) for an efficient project management organization.

- Project Manager positions should be filled by highly qualified employees (as part of a long-term personnel policy to groom Project Managers)
- The objective of a project and the tasks of the project manager should be clear.
- Contracts with customers should be clearly negotiated.
- Support should be available to the Project Manager (recognition and understanding)
- All levels of management should be systematically made aware of the tasks and responsibilities of Project Managers.
- The organizational structure should meet the needs of the company's business.
- All departments and subcontractors involved in the project's completion should be included in the project as early as possible.
- Responsibility should be congruent with acceptance.
- Psychological and social requirements should be considered.
- Personnel changes on teams should be avoided.
- **Intensive training and education in project management should be provided.**

## 4. The First Pilot Project for the New Project Team

### 4.1 The Tasks of the Project Management Teams

Hypermax's Executive Board decides to respond to **Family Fun Inc.'s** call for tenders for the **Rocket-Star** hyper coaster equipment as a pilot project in order to gain experience with its new project management organization.

As seminar participants, you will take over the role of the project management team for the **Rocket-Star** project. Your responsibilities are as follows:

1. To analyze the contract specifications.
2. To analyze the standardized project work breakdown structures.
3. To organize a project kick-off meeting with all participants to set a timeline and budget.
4. To optimize the project meeting in terms of time, cost, results, and profit margin.
5. To successfully execute the project, achieving the highest possible profit margin for the company.

### 4.2 The Contract Specifications of Family-Fun Inc.

#### 4.2.1 Technical Requirements, Data, and Parameters

- |   |   |
|---|---|
| 1. Length of the track traveled   | 1000 m  |
| 2. Maximum height of the track  | 50 m  |
| 3. Number of roller coaster cars  | 3   |
| 4. Number of passengers per car   | 36 (9 rows, 4 columns)  |
| 5. Inversions   | 4 (1 vertical loop and three heart line rolls)                |
| 6. Top speed  | 130 kmh   |
| 7. Peak acceleration  | 4.0 G   |
| 8. Longitudinal slope   | 97° (for an inversion)  |
| 9. Transverse slope   | 120° (minimum)  |
| 10. Duration of travel  | 2:00 Minutes  |
| 11. Standards to be met   | DIN / ISO / EN  |
| 12. 4-D-Soundsystem:  | 22 onboard loudspeakers per car and 200 boxes along the track |
| 13. Passengers per hour   | 1400  |
| 14. Equipment life  | 25 years / 2.0 million runs                                   |
| 15. The technology and attraction index of the hyper coaster must equal 100.0 points. |   |
| 16. The quality and reliability index of the hyper coaster must equal 100.0 points.   |   |

17. The passengers should be thrilled by the Rocket-Star experience.
18. Fast passenger changes are very important.
19. It is particularly important for the ride to be smooth and not jerky.
20. The area in which the amusement park will be situated is flat.
21. The soil of the area is very soft.
22. The deadline for the project is April 1 (week 65) when the season begins.
23. The bid price may not exceed 10.0 million Euros.

#### 4.2.2 Rewards/Penalties

Apart from the contract requirements, the date of completion (and possible early completion), the technology, and the equipment's quality are all important factors. A reward and penalty system has been created for the departments to make them more effective. **Family-Fun Inc.** offers the following rewards and penalties for their Rocket-Star project:

##### 4.2.2.1 Completion Date

Rewards		Penalties	
Early completion (weeks)	Reward per week (1000 €)	Late completion (weeks)	Penalty per week (1000 €)
1 - 2	300	1 - 3	200
3 - 5	250	4 - 6	250
6 - 7	200	7 - 10	300
under 7	150	over 10	400

##### 4.2.2.2 Technology and Attractivity

Rewards		Penalties	
Index	Reward per point (1000 €)	Index	Penalty per point (1000 €)
101 - 103	50	99 - 97	50
104 - 107	75	96 - 94	75
108 - 110	90	93 - 90	125
over 110	100	under 90	200

Hint: A technology index above 130 points will not accrue any additional bonus!

##### 4.2.2.3 Equipment Quality and Reliability

Rewards		Penalties	
Index	Reward per point (1000 €)	Index	Penalty per point (1000 €)
101 – 105	60	99 - 98	60
106 – 108	70	97 - 95	80
109 – 112	85	94 - 92	90
over 112	100	under 92	120

Hint: A quality index above 132 points will not accrue any additional bonus!



#### 4.2.3 The Rocket-Star Hypercoaster: Important Subprojects



Base

Steel support



Car

Track

Sound system



Steel support with base



Station building



Accelerator

1000 meters of track  
50 meters high