

Project Management

Summary

Fabian Damken

January 24, 2023



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Contents

1	Introduction	7
1.1	What is a project?	7
1.2	Overview	7
2	Linear Programming	8
2.1	Canonical Form	8
2.2	Formulating LP Models	8
2.3	Solving	8
2.3.1	Intuitively	8
2.3.2	Graphically	8
2.4	Anomalies	8
2.5	Examples	8
3	Budgeting	9
3.1	Uncertainty	9
3.2	Stage (Phase) Gates	9
3.3	Approaches	9
3.3.1	Work Breakdown Schedule	9
3.3.2	Design Structure Matrix	9
3.3.3	Top-Down Budgeting	9
3.3.4	Bottom-Up Budgeting	9
3.3.5	Behavioral Issues	9
3.4	Financial Issues	9
4	Scheduling	10
4.1	Representations	10
4.1.1	Work Breakdown Schedule	10
4.1.2	Gantt Chart	10
4.1.3	Activity Networks	10
4.2	Scheduling	10
4.2.1	Linear Programming	10
4.2.2	Critical Path Method	10
4.2.3	Early Start vs. Late Start	10
4.2.4	Uncertainty-Aware Scheduling: PERT	10
5	Resource Allocation	11
5.1	Resource Loading	11
5.2	Resource Leveling	11
5.2.1	“As Late As Possible” Heuristic	11
5.3	Constrained Resource Scheduling	11

5.4	Cost-Time Trade-Off	11
5.5	Crashing	11
5.5.1	CPM Heuristic	11
5.5.2	Cost-Duration History	11
5.5.3	Optimal Minimal Cost Due Date Crashing	11
6	Monitoring	12
6.1	Plan-Monitor-Control Cycle	12
6.2	Designing the Monitoring System	12
6.3	Earned Value Analysis (EVA)	12
6.3.1	Variance Metrics	12
6.3.2	Indices	12
6.3.3	More Terms	12
6.3.4	Example	12
7	Control	13
7.1	Control Systems	13
7.1.1	Cybernetic Controls	13
7.1.2	Go-No Go Controls	13
7.1.3	Post Controls	13
7.2	Critical Ratio	13
7.3	Balance	13
7.3.1	Creative Activities	13
7.3.2	Changes	13



List of Figures



List of Tables



List of Algorithms



1 Introduction

1.1 What is a project?

1.2 Overview

2 Linear Programming

2.1 Canonical Form

2.2 Formulating LP Models

2.3 Solving

2.3.1 Intuitively

2.3.2 Graphically

2.4 Anomalies

2.5 Examples

3 Budgeting

3.1 Uncertainty

3.2 Stage (Phase) Gates

3.3 Approaches

3.3.1 Work Breakdown Schedule

3.3.2 Design Structure Matrix

3.3.3 Top-Down Budgeting

3.3.4 Bottom-Up Budgeting

3.3.5 Behavioral Issues

3.4 Financial Issues

4 Scheduling

4.1 Representations

4.1.1 Work Breakdown Schedule

4.1.2 Gantt Chart

4.1.3 Activity Networks

Activity on Arc (AoA)

Activity on Node (AoN)

4.2 Scheduling

4.2.1 Linear Programming

4.2.2 Critical Path Method

4.2.3 Early Start vs. Late Start

4.2.4 Uncertainty-Aware Scheduling: PERT

Near-Critical Path and Second-Order Approximation

5 Resource Allocation

5.1 Resource Loading

5.2 Resource Leveling

5.2.1 "As Late As Possible" Heuristic

5.3 Constrained Resource Scheduling

5.4 Cost-Time Trade-Off

5.5 Crashing

5.5.1 CPM Heuristic

5.5.2 Cost-Duration History

5.5.3 Optimal Minimal Cost Due Date Crashing

6 Monitoring

6.1 Plan-Monitor-Control Cycle

6.2 Designing the Monitoring System

6.3 Earned Value Analysis (EVA)

6.3.1 Variance Metrics

6.3.2 Indices

6.3.3 More Terms

6.3.4 Example

7 Control

7.1 Control Systems

7.1.1 Cybernetic Controls

7.1.2 Go-No Go Controls

7.1.3 Post Controls

7.2 Critical Ratio

7.3 Balance

7.3.1 Creative Activities

7.3.2 Changes

Business Changes

Technical Changes
