

Contents

1	Introduction	1
1.1	Problem Statement	1
1.2	Objectives and Strategic Questions	4
1.3	Structure of the Volume	5
2	Significant Aspects of the Land-Based Long-Distance Freight Market	7
2.1	Overview	7
2.2	Political Objectives	7
2.3	Innovation Related Requirements	12
2.3.1	Carrier <i>Rail</i> : Full-Train and Single-Wagon Business	12
2.3.2	Carrier <i>Road</i> : Vehicle Fleet Development	13
2.3.3	Intermodal Transport	15
2.3.4	Infrastructure: The Degree of Modernization (Germany)	21
2.3.5	Demands of the Market	23
2.3.6	The Freight Transport Corridors Across Europe	26
2.4	Introducing the Three Fields of Action	28
3	Systemic, Migration Oriented Method of Innovation Management	33
3.1	Overview	33
3.2	Selected Aspects of System Theory	33
3.3	Selected Aspects of Innovation Management	36
3.4	Transfer Onto the Long-Distance Land-Based Freight Market	43
3.4.1	The Two <i>Hypotheses</i> of Innovations	43
3.4.2	Expected Characteristics of the Start-Up Situations	45
3.5	Introducing the Steps of the <i>Method</i> , Applying the Findings	49
4	Detailed Presentation of Supportive Tools	57
4.1	Overview	57
4.2	Enforcing Migration Orientation: Business Model (BM) (Tool 2, within Step 3)	57
4.3	Understanding the System Coherences and Choosing Migration-Oriented Solutions	58

4.3.1	The Sensitivity Analysis (SA) (Tool 3, within Step 4) ...	58
4.3.2	The Value Benefit Analysis (VBA) (Tool 4, within Step 4)	63
4.3.3	Technical Attractiveness (TA) (Tool 5, within Step 4) ..	68
4.3.4	The Scenario Technique (ST) (Tool 6, within Step 4) ...	75
4.4	Focussing Especially on the Social, Economical and Technological Attractiveness	77
4.5	To Estimate the Economic Feasibility	77
4.5.1	Demands	77
4.5.2	Return on Investment (ROI) (Tool 7, within Step 5) ...	79
4.5.3	Net Present Value (NPV) (Tool 8, within Step 5)	79
4.5.4	Profitability Estimation Focused on Benefits (PEFB) (Tool 9, within Sep 5)	80
4.6	Intermediate Summary and Classification of the Seven Case Studies	84
5	Case studies – Part I: Innovative Technologies in European Freight Transport	89
5.1	Overview	89
5.2	Introducing Truck Platoons on Motorways	90
5.2.1	Research Considering Truck Platoons on Motorways (Step 1)	90
5.2.2	Integrating Universities, Companies and Public Institutions (Step 2)	96
5.2.3	Improving Transport Efficiency (Step 3)	97
5.2.4	Driver-Organised Platoons (Step 4)	98
5.2.5	Design for Acceptance, Competitiveness and Feasibility (Step 5)	106
5.2.6	The Interfaces (Step 6)	118
5.2.7	Designing Prototypes, Efforts to Achieve Testing Accreditation (Step 7)	120
5.3	The Interactive Driving Simulator	121
5.3.1	The Need to Simulate Truck Platoons (Step 1)	121
5.3.2	University and Manufacturer Cooperation (Step 2)	126
5.3.3	Simulation Laboratory Offered to the Market (Step 3)	126
5.3.4	Real-Time, Real-Conditions Simulations (Step 5)	127
5.3.5	The Mock-Up Truck (Step 6)	128
5.3.6	The New Simulation Laboratory, Ongoing Improvement (Step 7 and 8)	130
5.4	Individualized Single-Wagon Door-to-Door Rail Transport ...	133
5.4.1	The Decreasing Single-Wagon Business (Step 1)	133
5.4.2	Integrating the Transport Enterprises (Step 2)	138
5.4.3	Improving Rail Freight Transport Flexibility (Step 3) ..	139
5.4.4	Developing Competitive Scenarios (Step 4)	140
5.4.5	Evaluating the Scenarios (Step 5)	140

5.4.6	Designing Work and Business Processes (Steps 6, 7 and 8)	141
5.5	Resume: Innovative Technologies in European Freight Transport	142
6	Case studies – Part II: Innovations to Improve the Intermodal Transport Chain	145
6.1	Overview	145
6.2	Semi-Trailers in Advanced European Intermodal Logistics (SAIL)	146
6.2.1	The Growing Numbers of Semi-Trailers (Step 1)	146
6.2.2	Integrating the Intermodal Transport Chain (Step 2) ..	150
6.2.3	Road-Only Versus Intermodal Transport (Step 3)	151
6.2.4	Analysing Different Solutions (Step 4)	154
6.2.5	Comparing the Different Solutions (Step 5)	158
6.2.6	Designing Two Prototype Systems (Steps 6 and 7)	170
6.2.7	Testing for Commercial Transportation (Step 8)	175
6.2.8	Challenging Innovation Oriented Politics	177
6.3	European Low-Platform Technologies for Non-Cranable Semi-Trailers	179
6.3.1	Analysing Four Low-Platform Technologies (Step 1) ...	179
6.3.2	Gaining Industrial Support (Step 2)	184
6.3.3	The Smooth Transport Chain (Step 3)	184
6.3.4	Comparing and Evaluating the Different Technologies (Steps 5 and 6)	184
6.3.5	Summarising the Findings of the Research Project	203
6.4	Resume: Innovations to Improve the Intermodal Transport Chain	204
7	Case studies – Part III: Logistic Service Innovations	205
7.1	Overview	205
7.2	Orient Freight Express	206
7.2.1	The Transport Corridor Great Britain-Turkey (Step 1)	206
7.2.2	Integrating International Freight Companies (Step 2) ..	211
7.2.3	Shifting Freight from Road to Rail (Step 3)	211
7.2.4	Improving Social and Economic Attractiveness (Steps 5/6)	213
7.2.5	The Prototype Service (Steps 7/8)	215
7.3	Poland-Spain Transport	215
7.3.1	The Transport Corridor Poland-Spain (Step 1)	215
7.3.2	International Freight Forwarder-Producer Cooperation (Step 2)	220
7.3.3	Shifting White-Goods Transport from Road to Rail (Step 3)	220

- 7.3.4 The Possible Modal Shift (Steps 5/6) 221
- 7.4 Resume: Logistic Service Innovations 224

- 8 Conclusions and Perspectives 225**
 - 8.1 Overview 225
 - 8.2 The Strategic Questions 225
 - 8.3 Results of the Seven Case Studies 229
 - 8.4 Responding to the Innovation-Related Requirements 232
 - 8.5 Future Research Demands 234
 - 8.6 Educational and Training Measures 236

- Summary 239**
- References 241**
- Subject Index 249**

Preface

During the past two centuries, the impact of technology on society has been more fundamental and far-reaching than any visionary, philosopher or science fiction author of the past could have ever imagined. The world as a whole and all its societies have been changing through the processes of developing, adapting and implementing very different kinds of technology. Particularly those enterprises engaged in transportation across national borders are highly complex systems in terms of specific dynamic interrelations between people, the organizations they work in, and the technology they work with. Furthermore they are embedded in very specific ways into these different societies which are taking advantage of transportation. Such enterprises are complex socio-technical systems. They need to continuously develop and redesign themselves in order to meet all the requirements of their tasks, under ever changing conditions. Introducing new transportation technology and new software tools into this market means instigating such fundamental change processes. These change processes are in themselves highly complex and need to be dealt with in a very conscious and multi-faceted approach.

These aspects are discussed in this book based on about 10 years of research which has mainly been funded by the German Federal Government and the European Union.

I owe special thanks to Prof. Dr.-Ing. Klaus Henning for a decade of learning and research possibilities. My professional career in research and industry is decisively based upon these years. Furthermore, I am much obliged to our different research teams and especially Rahel Danielzik for so many fruitful years of co-operation. I would also like to thank Prof. Dr.-Ing. Karsten Lemmer and Prof. Dr.-Ing. Henning Wallentowitz for accompanying and supporting the development of this book.

I am particularly grateful to Dr. Dietrich Brandt with whom I discussed on many occasions my scientific views, problems and visions. He has always been a source of inspiration.

Last but not least I would like to thank my parents Cécilia and Winfried Preuschoff for taking care of their daughters and for giving their education the highest priority, Susanne and Petra Preuschoff for their friendship and support, as well as Robin and Rhea Savelsberg for their care and encouragement during the past years of research and writing.

Aachen, November 2007

Priv.-Doz. Dr.-Ing. Eva Savelsberg