CONTENT

PREFACE III

CONTENT VII

TABLES IX

ILLUSTRATIONS X

ABBREVIATIONS XII

1 INTRODUCTION 1

1.1 SUPPORTING DECISIONS – THE TARGET OF THIS STUDY 1

1.2 THE STRUCTURE OF THIS STUDY 3

2 THE GLOBAL ECONOMY AT THE BEGINNING OF THE 21ST CENTURY – THE SYSTEM 7

2.1 WHAT IS "GLOBALIZATION"? 8

2.2 INTEGRATED PRODUCTION NETWORKS OF MULTINATIONAL ENTERPRISES 10

2.3 THE "WORLD ASSEMBLY LINE" PARADIGM – THE REFERENTIAL FRAME FOR THE SYSTEM 12

2.4 THE KEY PREREQUISITE OF THE WORLD ASSEMBLY LINE – FLEXIBILITY 15

2.5 REGIONAL TRADE BLOCS – INTERLINKAGES BETWEEN COUNTRIES 19

2.6 MEASURING PERFORMANCE WITH THE SHAREHOLDER VALUE APPROACH – A COMPANY'S COMPETITIVE POSITION 23

2.7 SUMMARY FOR THE SYSTEM 28

3 DECISIONS FOR A WORLD ASSEMBLY LINE – THE DECISION VARIABLES X 31

3.1 CONFIGURING A WORLD ASSEMBLY LINE – STRATEGIC PRE-DECISIONS 32

3.2 COORDINATING A WORLD ASSEMBLY LINE – TACTICAL DECISIONS 41

3.3 RUNNING A WORLD ASSEMBLY LINE – OPERATIVE DECISIONS 42

3.4 SUMMARY FOR THE DECISION VARIABLES 47

4 RELEVANT CONSTITUENTS FOR MODELING THE SETTING OF A WORLD ASSEMBLY LINE – THE ENVIRONMENTAL PARAMETERS Y 49

4.1 LAWS AND CONTRACTS – THE LEGAL ENVIRONMENT 50

4.2 EXCHANGE RATES, INTEREST RATES AND INFLATION – THE FINANCIAL ENVIRONMENT 65

4.3 INFRASTRUCTURE AND TECHNICAL DIMENSIONS – THE PHYSICAL ENVIRONMENT 79

4.4 SUMMARY FOR THE ENVIRONMENTAL PARAMETERS 84

5 MEASURING THE PERFORMANCE OF A WORLD ASSEMBLY LINE – THE DECISION CRITERION E 87

5.1 Evaluating Strategic, Tactical and Operative Decisions – Measuring the Performance of a World Assembly Line 88

5.2 Traditional Ways of Evaluating Operative Decisions – Performance of Supply Chains 89

5.3 Using the Cash Flow to Evaluate Operative Decisions for Supply Chain Optimization 93

5.4 Additional Information about Consequences of Decisions – Diagnostic Variables 97

5.5 Important Facts that Are Not Incorporated in the Decision Criterion – Imponderables 101

5.6 Summary for the Decision Criterion 103

6 VALÉRIE – THE MODEL F 107

6.1 Cryptic Signs – An Overview of the Symbols Used by VALérie 108

6.2 "Maximize the Cash Flow …" – Formulating the Objective Function and the Diagnostic Variables of VALérie 112

6.3 "… but Keep the Restrictions in Mind" – Modeling the Constraints of VALérie 115

6.4 "Produce Comprehension, Not Numbers" – Optimizing World Assembly Lines with VALérie 118

6.5 Studies Dealing with Similar Problems – An Overview on Literature 121

6.6 Summary for the Model 138

7 THE DAIMLERCHRYSLER WORLD ASSEMBLY LINE FOR COMMERCIAL VEHICLE ENGINES – THE CASE STUDY 141

7.1 Testing a Real World Assembly Line – The 1997 Base Case 142

7.2 Transforming Reality into VALérie's Logic – Fixing Parameters and Their Values 144

7.3 Analyzing Environmental Scenarios – Coordinating the World Assembly Line 150

7.4 Analyzing Strategic Alternatives – (Re)configuring the World Assembly Line 157

7.5 Analyzing "Unlimited Capacities" – Creating Flexibility for the World Assembly Line 166

7.6 Analyzing Traditional Supply Chain Optimization – Running the World Assembly Line 170

7.7 Summary for the Case Study 172

8 SUMMARY 175

8.1 Lessons Learned for Decision Support for World Assembly Lines 176

8.2 Key Results of the Case Study and Future Tasks 180

REFERENCES 183

APPENDIX A: WORLD TRADE BLOCS – STATUS, MEMBERS AND RECENT DEVELOPMENTS UNTIL END OF 2001

APPENDIX B: THE BRIEF VERSION OF VALÉRIE

BIBLIOGRAPHY

TABLES

Table A: World trade blocs and councils 23
Table B: Main types of contracts, defined parameters and their duration 58
Table C: Hedging the risks of parameter changes of the legal environment 64
Table D: An example for strategic inventory management 75
Table E: Only configuring and coordination the WAL can adequately fight operating exposure 79
Table F: Parameters of air- and sea-freight (example) 80
Table G: Hedging against changes of physical parameters 83
Table H: Overview on hedging instruments/actions for changes in relevant parameters of the WAL 85
Table I: Advantages of structured valuation 96
Table J: Global cash flow matrix – before taxes and weighted with the share of capital (example) 119
Table K: Global bill of materials (example) 120
Table L: An overview on literature 136
Table M: Values for indices of the case study 145
Table N: List of parameters 146
Table O: Effects of a 50% fall in demand in various trade blocs 153
Table P: Effects of a 50% fall in demand for certain types of engines 154
Table Q: Effects of buying/selling DDC shares 159
Table R: Effects on value creation when introducing MB engines to NAFTA 160
Table S: Changing the configuration of the WAL by introducing new elements 162
Table T: New configurations of the WAL and the Asian/Brazilian Crisis of 1998 164
Table U: Optimizing the WAL in case of unlimited capacities 168

ILLUSTRATIONS

Illustration 1: The structure of the study 6
Illustration 2: Frame and canvas of the study 7
Illustration 3: Production sites of DaimlerChrysler for Commercial Vehicles in 1997 10
Illustration 4: The transportation matrix 11
Illustration 5: Commonly used capacities (example) 14
Illustration 6: Interest rate convergence in the EUR-zone 20
Illustration 7: Effects of trade bloc integration on macro-economic parameters 21
Illustration 8: World trade blocs 22
Illustration 9: Control of elements – borders of the MNE (example) 27
Illustration 10: The fixed canvas 29
Illustration 11: Putting the background colors on the canvas 31
Illustration 12: Compensation levels – total hourly compensation for manufacturing workers (wages plus supplementary benefits) in USD (1997) 33
Illustration 13: Compensation levels in USD (1998) 34
Illustration 14: Compensation levels in USD (1999) 35
Illustration 15: Compensation levels in USD (2000) 35
Illustration 16: Material flows between elements 41
Illustration 17: Typical supply chain in global logistics 43
Illustration 18: Concept of Progress Numbers 43
Illustration 19: Investment in inventory and delivery time requirements 45
Illustration 20: The decision variable of the WAL 48
Illustration 21: Composing the environment of VALérie 49
Illustration 22: Corporate tax rates of 1998 in % 56
Illustration 23: International terms of payment 60
Illustration 24: Incoterms 62
Illustration 25: The progress of the EUR in per cent and in USD/EUR 65
Illustration 26: The world's currency areas 66
Illustration 27: Financial risks to the MNE 67
Illustration 28: An overview on classical hedging instruments 68
Illustration 29: Levels for hedging against changes in financial parameter's values 68
Illustration 30: The operating exposure 71
Illustration 31: Development of the JPY vs. the USD 73
Illustration 32: Financial equilibrium relationships 76
Illustration 33: Determining environmental scenarios for the WAL 86
Illustration 34: A frame for the canvas makes a picture 87
Illustration 35: From proxy-criteria to structured valuation 95

Illustration 36: Hierarchy of diagnostic variables of the financial sphere 100
Illustration 37: The decision criterion links decisions and environment 105
Illustration 38: The model links decisions, environment and efficiency 107
Illustration 39: The syntax for material flows 108
Illustration 40: VALérie in the center of the study 139
Illustration 41: A case study fixes the WAL's portrait on the wall 141
Illustration 42: The integrated production network for truck/industrial engines of Mercedes-Benz's Commercial Vehicle Division (1997) 142
Illustration 43: Optimal material flows for the referential scenario (1997) 149
Illustration 44: Risk analysis for changing FX-rates (example) 149
Illustration 45: Results of tested environmental scenarios 151
Illustration 46: Changes in material flows because of a 50% fall in demand in various trade blocs 153
Illustration 47: Changes of the currency risk situation due to a 50% fall in demand for certain types of engines 154
Illustration 48: Changes in material flows because of a 50% fall in demand for certain types of engines 155
Illustration 49: Results for historical development of parameters' values 156
Illustration 50: Results for tested strategic alternatives 158
Illustration 51: Results for tested changes of other contractual parameters 159
Illustration 52: Currency risk linked to foreign direct investment in the US 160
Illustration 53: Related currency risk for substituting DDC engines by MB engines 161
Illustration 54: Optimal material flows for substituting DDC by MB engines 161
Illustration 55: Foreign exchange rate related risk of Asian investments (limited capacities) 162
Illustration 56: Foreign exchange rate related risk of Asian investments (unlimited capacities) 163
Illustration 57: Material flows for a WAL with Chinese dummy source 163
Illustration 58: Material flows for a WAL with Japanese dummy destination 164
Illustration 59: Optimal material flows for existing Japanese dummy for Asian Crisis 165
Illustration 60: Results for how flexibility assists value creation – unlimited capacities 166
Illustration 61: Changing material flows for unlimited capacities 167
Illustration 62: How the shape of the WAL changes with the BRL/EUR exchange rate 168
Illustration 63: Risk deriving from changes in exchange rates (limited capacities) 169
Illustration 64: Risk deriving from changes in exchange rates (unlimited capacities) 169
Illustration 65: Influence of BRL/EUR rate on optimal material flows 169
Illustration 66: Results for tested classical logistical parameters 171
Illustration 67: Risk situation of the case study WAL due to environmental changes 173
Illustration 68: Portfolio for trade blocs and countries 173
Illustration 69: The finished portrait of Value-Adding Logistics for a WAL 175