

# Table of Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	MOTIVATION AND RESEARCH QUESTIONS .....	3
1.2	METHODOLOGY .....	4
1.3	STRUCTURE OF THE THESIS.....	5
<b>2</b>	<b>THE CONCEPT OF INFORMATION LOGISTICS .....</b>	<b>7</b>
2.1	BASIC ASPECTS OF INFORMATION AND LOGISTICS .....	7
2.1.1	<i>About the term information.....</i>	<i>7</i>
2.1.2	<i>About the term logistics.....</i>	<i>10</i>
2.1.3	<i>First definitions on information logistics.....</i>	<i>12</i>
2.2	CONNECTION BETWEEN INFORMATION LOGISTICS AND GOODS LOGISTICS .....	15
2.2.1	<i>Basic aspects of goods logistics.....</i>	<i>15</i>
2.2.2	<i>Similarities, interdependencies and differences.....</i>	<i>16</i>
2.3	CONNECTION BETWEEN INFORMATION LOGISTICS AND INFORMATION MANAGEMENT .....	21
2.3.1	<i>Basic aspects and tasks of information management.....</i>	<i>21</i>
2.3.1.1	Information need analysis .....	23
2.3.1.2	Procurement of information.....	25
2.3.1.3	Information supply.....	26
2.3.2	<i>Classification of information logistics within information management.....</i>	<i>27</i>
2.4	FURTHER ASPECTS OF INFORMATION LOGISTICS AND AREAS OF ITS APPLICATION.....	29
2.4.1	<i>Information logistics as instrument for the improvement of cooperative service preparation .....</i>	<i>30</i>
2.4.2	<i>Organizational and industry-specific implications of information logistics .....</i>	<i>31</i>
2.5	INFORMATION-LOGISTICAL TASKS AND PROBLEMS .....	33
2.5.1	<i>Defining a basic information-logistical infrastructure.....</i>	<i>33</i>
2.5.2	<i>Design of the information-logistical infrastructure .....</i>	<i>36</i>
2.5.2.1	Allocation of information .....	36
2.5.2.2	Selection of communication channels.....	38
2.5.2.3	Selection of communication paths .....	40

2.5.2.4	Decision about the implementation of interfaces and standards .....	42
2.5.2.5	Selection of software application .....	44

### **3 SELECTED THEORETICAL FOUNDATIONS OF NETWORKING..... 47**

3.1	TRANSACTION COSTS THEORY AS THEORETICAL FOUNDATION .....	47
3.1.1	<i>Basic aspects</i> .....	48
3.1.1.1	Reasons for transaction costs and factors of influence.....	50
3.1.1.2	Optimal governance structure.....	52
3.1.2	<i>Transaction costs theory and information logistics</i> .....	55
3.1.2.1	General effects of IT use .....	56
3.1.2.2	Trend to reticulate coordination forms considering the effects of IT use on the transaction costs.....	57
3.1.3	<i>Assessment</i> .....	61
3.2	NETWORK EFFECT THEORY AS THEORETICAL FOUNDATION.....	63
3.2.1	<i>Basic aspects</i> .....	63
3.2.2	<i>Dependence between network effect theory and information logistics</i> .....	65
3.2.2.1	Advantages and disadvantages of standardization: Centralized vs. decentralized decision making.....	65
3.2.2.2	Standardization decisions in supply chain networks.....	67
3.2.3	<i>Assessment</i> .....	70

### **4 EMPIRICAL ANALYSIS OF BUSINESS RELATIONS IN THE EUROPEAN AUTOMOTIVE INDUSTRY .... 73**

4.1	AUTOMOTIVE INDUSTRY: A BRIEF INTRODUCTION.....	73
4.2	DESIGN OF THE EMPIRICAL STUDY AND DEMOGRAPHIC DATA.....	75
4.3	THE EXCHANGE OF BUSINESS DOCUMENTS .....	78
4.3.1	<i>A brief introduction to the exchange of business documents</i> .....	78
4.3.2	<i>Results</i> .....	82
4.3.2.1	General findings on the exchange of business documents.....	82
4.3.2.2	Findings on the proportion of several methods used to exchange business documents .....	85
4.3.2.3	Further findings on EDI usage.....	87
4.3.2.3.1	Usage of EDI standards .....	87
4.3.2.3.2	Exchanged EDI document types.....	89

4.3.3	<i>Case Study Schenker Cooperation: EDI-based exchange of business documents in an automotive supply chain</i> .....	91
4.3.3.1	Information and goods flow.....	92
4.3.3.2	Information-logistical infrastructure and assessment.....	96
4.4	BUSINESS SOFTWARE.....	97
4.4.1	<i>A brief introduction to business software applications</i> .....	97
4.4.1.1	Enterprise resource planning systems.....	97
4.4.1.2	Internet applications.....	99
4.4.1.3	Advanced planning and scheduling systems.....	101
4.4.2	<i>Results</i> .....	103
4.4.2.1	Findings on ERP system use.....	103
4.4.2.2	Internet-based applications.....	105
4.4.2.2.1	Findings on Internet application use.....	105
4.4.2.2.2	Case study FAG Kugelfischer: Costs and benefits from using Internet applications.....	107
4.4.2.3	Findings on APS use.....	109
4.5	E-PROCUREMENT.....	111
4.5.1	<i>Overview</i> .....	111
4.5.2	<i>Results</i> .....	113
4.5.2.1	General findings on e-procurement use.....	113
4.5.2.2	Findings about purchased goods and services.....	114
4.5.2.3	Functions and services used.....	115
4.5.2.4	Findings on transaction costs and purchasing costs.....	117
4.5.2.5	Barriers to implementation and utilization.....	118
4.6	ELECTRONIC MARKETS.....	119
4.6.1	<i>Overview</i> .....	119
4.6.1.1	Basic aspects.....	119
4.6.1.2	Vertical markets in the automotive industry.....	120
4.6.2	<i>Case study SupplyOn: A supplier-driven e-market in the automotive industry</i> .....	121
4.6.2.1	Development.....	121
4.6.2.2	Characteristics.....	122
4.6.2.3	Assessment.....	123
4.6.3	<i>Results</i> .....	124
4.6.3.1	Findings on e-market participation.....	124
4.6.3.2	Findings on goods and services purchased.....	126
4.6.3.3	Market functions and services.....	127

4.6.3.4	Findings on transaction costs and purchasing costs.....	128
4.6.3.5	Barriers to participation.....	129
4.6.3.6	Importance of various marketplace characteristics.....	130
4.7	COLLABORATIVE BUSINESS SCENARIOS AND CONCEPTS .....	132
4.7.1	<i>A brief overview of collaborative business concepts and scenarios.....</i>	<i>132</i>
4.7.2	<i>Results .....</i>	<i>133</i>
4.7.2.1	Status quo and the future of EDI-based collaboration.....	133
4.7.2.2	Status quo and the future of Internet-based collaboration.....	137
4.8	ORGANIZATIONAL CHANGES .....	139
<b>5</b>	<b>AN ECONOMIC MODEL OF INFORMATION LOGISTICS .....</b>	<b>141</b>
5.1	MODEL OF INFORMATION LOGISTICS.....	141
5.1.1	<i>Assumptions and factors of influence.....</i>	<i>142</i>
5.1.2	<i>Formal approach.....</i>	<i>147</i>
5.2	A SEARCH STRATEGY FOR OBTAINING AN OPTIMAL SOLUTION .....	149
5.2.1	<i>Problem 1: Finding the optimal flow of information in a given network .....</i>	<i>149</i>
5.2.2	<i>Problem 2: Finding the optimal configuration for each node in the network.....</i>	<i>150</i>
5.2.3	<i>Examples for problem 1 .....</i>	<i>152</i>
5.2.4	<i>Examples of problem 2 .....</i>	<i>155</i>
5.2.4.1	Network scenario 1 .....	155
5.2.4.2	Network scenario 2.....	159
5.3	CHARACTERISTICS OF THE OPTIMAL SOLUTION .....	162
5.4	QUALITY VERSUS COMPUTATION TIME .....	163
5.5	DISCUSSION OF PRACTICAL APPLICABILITY .....	163
<b>6</b>	<b>APPLICATION OF THE THEORETICAL FINDINGS ON AUTOMOTIVE NETWORKS .....</b>	<b>165</b>
6.1	GENERAL FRAMEWORK FOR AUTOMOTIVE SUPPLY CHAIN NETWORKS .....	165
6.1.1	<i>Business relations and network topology.....</i>	<i>166</i>
6.1.2	<i>Information flows and types of information.....</i>	<i>168</i>
6.1.3	<i>Configuration of nodes and costs of use.....</i>	<i>169</i>
6.1.4	<i>Impact of node configurations on the communication cost.....</i>	<i>172</i>
6.2	NUMBER OF POSSIBLE NETWORK CONFIGURATIONS.....	175

6.3	AN ANALYSIS OF INFORMATION-LOGISTICAL INFRASTRUCTURES AND INFORMATION FLOWS USING THE EXAMPLE OF SPECIFIC SUPPLY CHAINS IN THE AUTOMOTIVE INDUSTRY .....	176
6.3.1	<i>Supply chain example 1</i> .....	176
6.3.1.1	Parameters and patterns .....	176
6.3.1.2	Analysis and discussion of supply chain 1 .....	180
6.3.2	<i>Supply chain example 2</i> .....	185
6.3.2.1	Parameters and patterns of supply chain 2.....	185
6.3.2.2	Analysis and discussion of supply chain 2.....	188
6.4	A SUPPLY CHAIN NETWORK PERSPECTIVE.....	193
6.4.1	<i>Parameters and patterns</i> .....	193
6.4.2	<i>Analysis and discussion of the supply chain network</i> .....	193
<b>7</b>	<b>CONCLUSIONS AND OUTLOOK .....</b>	<b>197</b>
7.1	SUMMARY OF THE FINDINGS.....	197
7.2	OUTLOOK.....	202
	<b>REFERENCES .....</b>	<b>205</b>
	<b>FIGURES .....</b>	<b>221</b>
	<b>TABLES .....</b>	<b>225</b>
	<b>EQUATIONS .....</b>	<b>227</b>
	<b>VARIABLES AND SYMBOLS .....</b>	<b>229</b>
	<b>ABBREVIATIONS.....</b>	<b>231</b>