

Contents

Foreword of the Editor	5
List of Figures	10
List of Tables	11
1 Introduction	13
1.1 Motivation	13
1.2 Overview	13
2 Globalisation effects on port competition	15
2.1 Impacts of globalisation on trade and transport technology	15
2.1.1 Removal of trade barriers	16
2.1.2 Deregulation of ports	16
2.1.3 Transport technology	17
2.2 Challenges for the global transport system	19
2.2.1 Maritime networks	19
2.2.2 New role of ports	20
2.3 Emergence of strategical cooperation	23
2.3.1 Maritime and port alliances	23
2.3.2 Maritime and hinterland interdependencies	23
2.3.3 Port and hinterland reciprocity	24
2.4 Competition between port-hinterland systems	25
2.5 Synopsis	27
3 Hinterland transportation analysis	29
3.1 Definition and methodological approach	29
3.2 Modes of transport and intermodality	30
3.2.1 Road	30
3.2.2 Railways	30
3.2.3 Inland waterways	31
3.2.4 Short-sea shipping	31
3.2.5 Interoperability	31
3.3 Typology of actors	33
3.3.1 Generators of demand (shippers)	34
3.3.2 Builders of transportation chains	34
3.3.3 Infrastructure operators and managers	36
3.3.4 Carriers	37
3.4 Decision-making process	38
3.4.1 Demand and supply interactions	39
3.4.2 Markets' perception	42
4 Modelling the emergence of colloidal structures in hinterland freight transportation	43

Contents

4.1	The concept of Colloidal Structures	43
4.2	Theoretical framework	45
4.2.1	Freight modelling considerations	45
4.2.2	Economic choices	46
4.2.3	Entropy	49
4.3	Modelling dynamic economic choices with the master equation	52
4.3.1	Equilibrium number of alternatives of the Master equation	53
4.3.2	Condition for mesoscopic structural system dynamics	55
4.4	Development of a new conceptual approach	56
4.4.1	Cohesion between meso-dynamics and Entropy variation	56
4.4.2	Free Economic Energy	57
4.5	Experimental validation	59
5	Extension of the FEE for spatial modelling	65
5.1	Distribution notions and problem definition	65
5.1.1	Literature review	65
5.1.2	Problem statement	67
5.1.3	Subcategorisation of demand segments	68
5.1.4	Representative demand cell's function	69
5.2	Extension to one dimension	70
5.2.1	Linear proportion of fixed costs	70
5.2.2	Linear transport cost and location	71
5.2.3	Interpolation of distribution demands over one dimension	77
5.3	Accession to two dimensions	79
5.3.1	Spatial proportion of fixed costs	79
5.3.2	Spatial transport cost and position	81
5.3.3	Generalised functions over two dimensions	85
6	Real Validation and application cases to the German hinterland	87
6.1	Data sources	87
6.1.1	Description of the inland terminals' data	87
6.1.2	Database overview on the employees per productivity sector	87
6.1.3	Aggregated data on export and import trades	88
6.1.4	Database on the production per sector in Germany	88
6.1.5	Regional data at a district level	89
6.2	Processing of databases	89
6.2.1	Distance between clusters	90
6.2.2	Industrial density	92
6.3	Real case validation of the spatial FEE extension	94
6.3.1	Data adjustments	96
6.3.2	Assessment of Policy Strategies to develop Intermodal Services	98
6.3.3	Spatial policy assesment in intermodal offers	102
7	Conclusion	105
A	Selection of the builder	111
A.1	Subcontracting	112

A.2 Contracts	113
B Market segments influencing colloidal structures	115
B.1 Door-to-door vs. Just-in-time deliveries	115
B.2 Carrier vs. Merchant haulage	116
C Alternative Classical deduction of the Equilibrium	118
D Integral solution	120
Bibliography	123