

# Towards the development of a holistic planning framework for a Logistics City-Cluster: A multinational modified Delphi Study

A thesis submitted in fulfilment of the requirements for  
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## **ABSTRACT**

Macroeconomic competition between regions and countries has intensified dramatically in recent years, and as a result, selection of a favourable location and organisation of a logistics node plays an important role in determining a region's ability to participate in emergent globalisation opportunities. Global connectivity of an area and its related industries, together with their ability to retain and further develop a 'competitive advantage', requires a significant review of the way in which a region interfaces with the rest of the world.

The Logistics City-Cluster concept, which is one of the latest manifestations of a logistics node, is believed to be a suitable strategy to address these changes. However, whilst the Logistics City-Cluster is accepted by industry as a viable and unique concept, the nature of composition, characteristics and impact is still fragmented and very limited. The continued growth of this new strategy has made it imperative to develop a coherent knowledge base, ensuring future orderly development. Hence, this research was twofold: first, it sought to contribute to the theoretical knowledge of the common enabling elements of a Logistics City-Cluster and of their core influential factors; and secondly to explore the underlying assumptions that sustainable regional growth can be provided by such a concept.

Because of the limited literature and inherently subjective nature of the conceptual environment, a modified Delphi approach, applying three iterations, appeared to be the most suitable methodology for the development of a Logistics City-Cluster framework. Round I used relevant literature and two un-structured interviews with key informants to generate a preliminary framework. Round II enriched and restructured this preliminary work using semi-structured face-to-face interviews with respondents who held significant executive positions in four European Logistics City-Clusters. In Round III, the elaborated framework was substantiated via a questionnaire to experts associated with world class clusters in Europe and the Asia-Pacific region.

This resulting Logistics City-Cluster framework consists of three main categories. The 'Enabling' category, the centre of the framework, integrates a logical grouping of eight sub-categories that represent both tangible and intangible capacity, and provide the means for the management and development of Logistics City-Cluster. The 'Influence' category involves politics and geography, which have an obvious effect on the enabling

elements. Both influential aspects are imperative for the development and growth of the Logistics City-Cluster. Finally, the 'Impact' category describes the positive and negative effects on the economy, environment and society that occur within a region due to the existence of a logistics-driven system.

This research provides a systematic contribution to knowledge by: (i) clearly defining a Logistics City-Cluster and distinguishing it from other existing logistics type configurations; (ii) structuring its enabling elements and representing their mutual interactions; (iii) identifying external influences on the setup of a Logistics City-Cluster; and (iv) understanding the impact on a host region caused by introduction of a Logistics City-Cluster. Most importantly, it presents a validated description which brings the three categories together in one holistic framework, since changing one parameter of the model results in the alteration of other due to the dynamic interdependencies of the categories and their sub-concepts.

The developed framework and its derived implications hold the potential for the efficient planning of Logistics City-Clusters, in order to achieve competitive advantage as a supply chain location. In particular, the fact that the framework is derived from, and validated by, executive experts underpins its potential as an integrated tool-kit that offers detailed knowledge to facilitate systematic development or expansion of Logistics City-Clusters. It provides a roadmap to guide the efficient allocation of resources to facilitate a sustainable development. Indeed, the major contribution for the practitioner is the assertion that the framework is a holistic system in which all categories have dynamic interdependencies. Hence, the categories cannot be dealt with separately when attempting to achieve long term success.

Recently, aspects of this framework have been adapted to inform a Logistics City-Cluster guideline framework for the Victorian State Government in Australia. This work has led to a further tailor-made 'scoping framework' that was used to investigate the development of a possible Logistics City-Cluster for the Western Metropolitan Region of Melbourne. Additionally, elements of the empirical framework, in combination with the general assessment of the Western Metropolitan Region of Melbourne, were transformed into a specific spatial allocation framework.

## **DECLARATION**

I, Carsten Sengpiehl, declare that the PhD thesis entitled “Towards the development of a holistic planning framework for a Logistics City-Cluster: A multinational modified Delphi-Study” is no more than 120,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Signature:

Date:

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## List of Recent Publications

### Journal Publications

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Toh, K.T.K., Oakden, R., Nagel, P., Sengpiehl, C. and Shi, P. (2008) A Model for an Inland Port in Australia. *Journal of Transport and Supply Chain Management*. **2** (1), 78-92.

### Refereed Conference Publications

Sengpiehl, C., Wu, Y. and Nagel, P. (2009) Logistics Cities: A Spatial Requirement Framework. In: *14<sup>th</sup> International Symposium on Logistics – Global Supply Chain and Inter-Firm Networks. Proceedings of 14<sup>th</sup> ISL, 2009*. Istanbul: Centre for Concurrent Enterprises Nottingham University.

Manzoni, A. and Sengpiehl, C. (2009) Inter-Firm Performance for Global Networks: An Optimisation Model Using Data Envelopment Analysis. In: *14<sup>th</sup> International Symposium on Logistics – Global Supply Chain and Inter-Firm Networks. Proceedings of 14<sup>th</sup> ISL, 2009*. Istanbul: Centre for Concurrent Enterprises Nottingham University.

Wu, Y., Sengpiehl, C., Toh, K. and Nagel, P. (2009) The Progression to Logistics City and its Implication on Economies of Agglomeration. In: *14<sup>th</sup> International Symposium on Logistics – Global Supply Chain and Inter-Firm Networks. Proceedings of 14<sup>th</sup> ISL, 2009*. Istanbul: Centre for Concurrent Enterprises Nottingham University.

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### Technical Paper:

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Nagel, P., Wu, Y. and Sengpiehl, C. (2009) *Western Metropolitan Region of Melbourne – Logistics City*. Melbourne: Technical Report by the Institute for Logistics and Supply Chain Management.

# TABLE OF CONTENTS

ABSTRACT.....	i
DECLARATION .....	iii
ACKNOWLEDGEMENTS.....	iv
LIST OF RECENT PUBLICATIONS.....	vi
TABLE OF CONTENTS.....	vii
LIST OF FIGURES.....	xiii
LIST OF TABLES .....	xvii
LIST OF ABBREVIATIONS.....	xviii

## CHAPTER 1

<b>INTRODUCTION .....</b>	<b>1</b>
1.1. BACKGROUND AND CONTEXT .....	1
1.2. RESEARCH OBJECTIVES .....	4
1.3. RESEARCH PARADIGM, METHODOLOGY AND METHODS .....	5
1.4. SIGNIFICANCE OF THE STUDY .....	8
1.5. STRUCTURE OF THE THESIS.....	9

## CHAPTER 2

<b>LITERATURE REVIEW: LOGISTICS CITY-CLUSTERS.....</b>	<b>12</b>
2.1 INTRODUCTION .....	12
2.2 REVIEW OF LOGISTICS NODE PROGRESSIONS.....	13
2.2.1 ‘Freight Villages’.....	13
2.2.2 ‘Inland Ports’.....	15
2.2.3 ‘Freight Hubs’.....	17
2.2.4 ‘Intermodal Terminals’.....	18
2.2.5 ‘Logistics Cities’.....	19
2.2.6 ‘Logistics Clusters’.....	23
2.2.7 <i>Evolution of logistics nodes</i> .....	26
2.2.8 <i>Concluding logistics node progressions</i> .....	29
2.3 REVIEW OF CLUSTER THEORIES .....	31
2.3.1 <i>Relevant cluster theories</i> .....	32
2.3.1.1 The ‘Neo-Classic Economic School of Thought’ .....	35
2.3.1.2 The ‘Social and Institutional School of Thought’ .....	38
2.3.1.3 The ‘Strategic Diamond School of Thought’ .....	39
2.3.1.4 Various ‘Smaller Schools of Thought’ .....	42
2.3.2 <i>Concluding cluster theories</i> .....	44
2.4 REVIEW OF SUSTAINABLE DEVELOPMENT .....	45
2.4.1 <i>The concept of sustainable development</i> .....	46
2.4.2 <i>The ‘Triple Bottom Line’ approach</i> .....	48
2.4.2.1 The economic dimension .....	50
2.4.2.2 The environmental dimension .....	51
2.4.2.3 The social dimension .....	53
2.4.3 <i>Concluding sustainable development</i> .....	55
2.5 CONCLUDING THE LITERATURE REVIEW .....	56

## CHAPTER 3

<b>THE RESEARCH DESIGN .....</b>	<b>59</b>
3.1 INTRODUCTION .....	59
3.2 DISCUSSION OF ALTERNATIVE RESEARCH DESIGNS.....	60
3.3 DESCRIPTION OF THE RESEARCH PARADIGM .....	62
3.3.1 <i>Constructivism: The underpinning epistemology</i> .....	63
3.3.2 <i>Interpretivism: The underpinning theoretical perspective</i> .....	64
3.4 METHODOLOGY: THE MODIFIED 'DELPHI STUDY' .....	64
3.4.1 <i>Investigation of possible methodologies</i> .....	65
3.4.2 <i>Justification for using a modified 'Delphi Study'</i> .....	67
3.4.3 <i>Key principles of the applied modified 'Delphi Study'</i> .....	69
3.4.3.1 The role of the expert panel.....	69
3.4.3.2 The use of iterative rounds .....	71
3.4.3.3 The process of controlled feedback.....	72
3.4.3.4 The anonymity of response .....	73
3.5 DATA COLLECTION AND ANALYSIS METHODS.....	73
3.5.1 <i>Methods applied in 'Round I'</i> .....	73
3.5.1.1 Data Collection: Literature reinterrogation and un-structured interviews.....	74
3.5.1.2 Data Analysis: Content analysis.....	76
3.5.2 <i>Methods applied in 'Round II'</i> .....	78
3.5.2.1 Data Collection: Semi-structured face-to-face interviews .....	78
3.5.2.2 Data Analysing: Substantial and theoretical coding.....	80
3.5.3 <i>Methods applied in Round III</i> .....	82
3.5.3.1 Data Collection: Survey questionnaire.....	82
3.5.3.2 Data Analysis: Descriptive statistics.....	84
3.6 CONCLUDING THE STRENGTHS AND WEAKNESSES OF THE RESEARCH DESIGN .....	85

## CHAPTER 4

<b>DELPHI ROUND I: ESTABLISHING THE PRELIMINARY LOGISTICS CITY-CLUSTER FRAMEWORK .....</b>	<b>88</b>
4.1 THE PRELIMINARY LOGISTICS CITY-CLUSTER FRAMEWORK.....	88
4.2 THE PRELIMINARY 'ENABLER' CATEGORY .....	89
4.2.1 <i>Infrastructure</i> .....	89
4.2.2 <i>Services</i> .....	91
4.2.3 <i>Skilled workforce</i> .....	93
4.2.4 <i>Proximate demand</i> .....	94
4.2.5 <i>Stakeholders</i> .....	94
4.2.6 <i>Governance and policy</i> .....	95
4.2.7 <i>An overview of the 'Enabler' category</i> .....	96
4.3 THE PRELIMINARY 'SCOPE' CATEGORY .....	98
4.3.1 <i>Economic dimension</i> .....	98
4.3.2 <i>Environmental dimension</i> .....	99
4.3.3 <i>Social dimension</i> .....	101
4.3.4 <i>An overview of the 'Scope' category</i> .....	102
4.4 CONCLUDING 'DELPHI ROUND I' .....	102

## CHAPTER 5

### DELPHI ROUND II: THE CONCEPT OF LOGISTICS CITY-CLUSTERS AND AN ELABORATED FRAMEWORK ..... 106

5.1 INTRODUCTION AND STRUCTURE OF THE CHAPTER.....	106
5.2 A DEFINITIONAL CONCEPTION: LOGISTICS CITY-CLUSTERS .....	106
5.2.1 <i>Interpretations of the current term 'Clusters'</i> .....	107
5.2.2 <i>Interpretations of the current term 'Logistics'</i> .....	108
5.2.3 <i>The relevance of geographical borders</i> .....	112
5.2.4 <i>Interim conclusions</i> .....	115
5.3 AN ELABORATED LOGISTICS CITY-CLUSTER FRAMEWORK .....	115
5.3.1 <i>Reflection on the amendments of the preliminary framework</i> .....	116
5.3.2 <i>The elaborated Logistics City-Cluster framework</i> .....	117

## CHAPTER 6

### DELPHI ROUND II: EXPLICATION OF THE ENABLING CATEGORIES..... 118

6.1 THE ENABLER CATEGORY OF LOGISTICS CITY-CLUSTERS .....	118
6.1.1 <i>Market Enabler</i> .....	119
6.1.1.1 Segmentation of markets .....	119
6.1.1.2 Local, regional and international markets .....	120
6.1.1.3 The role of market size .....	123
6.1.1.4 The relevance of the quality of markets .....	124
6.1.1.5 Concluding the 'Market' enabler.....	126
6.1.2 <i>Infrastructure Enabler</i> .....	127
6.1.2.1 The critical function of logistics infrastructure .....	127
6.1.2.2 The necessity of IT infrastructure.....	132
6.1.2.3 The role of social infrastructure.....	133
6.1.2.4 Concluding the 'Infrastructure' enabler .....	135
6.1.3 <i>Service Enabler</i> .....	137
6.1.3.1 The lower and higher value-add logistics activities .....	137
6.1.3.2 The role of services supporting logistics activities .....	140
6.1.3.3 The importance of logistics activities in a region .....	142
6.1.3.4 Concluding the 'Service' enabler .....	144
6.1.4 <i>Workforce Enabler</i> .....	145
6.1.4.1 Segmentation of workforce .....	145
6.1.4.2 Challenges of recruiting appropriate workforce .....	148
6.1.4.3 Demand coverage of required workforce.....	149
6.1.4.4 Proximity of workforce .....	150
6.1.4.5 Concluding the 'Workforce' enabler.....	151
6.1.5 <i>Knowledge Enabler</i> .....	152
6.1.5.1 The role of knowledge creation .....	153
6.1.5.2 Private and public involvement in knowledge creation .....	155
6.1.5.3 Collaboration in the area of innovation .....	156
6.1.5.4 Concluding the 'Knowledge' enabler .....	158
6.1.6 <i>Capital Enabler</i> .....	159
6.1.6.1 The private and public role related to capital accessibility .....	159
6.1.6.2 Accessibility of capital for operational functionalities .....	160
6.1.6.3 Accessibility of capital for infrastructure investment .....	162
6.1.6.4 Concluding the 'Capital' enabler .....	165

6.1.7	<i>Competition Enabler</i> .....	166
6.1.7.1	The role of intra-competition.....	166
6.1.7.1.1	Intra-competition of trade gateways.....	167
6.1.7.1.2	Intra-competition of logistics service provider.....	168
6.1.7.2	The role of inter-competition.....	169
6.1.7.2.1	Inter-competition of trade gateways.....	170
6.1.7.2.2	Inter-competition of logistics service providers.....	171
6.1.7.2.3	Inter-competition and the notion of proximity.....	172
6.1.7.3	Concluding the ‘Competition’ enabler.....	173
6.1.8	<i>Governance Enabler</i> .....	174
6.1.8.1	The necessity of governance.....	175
6.1.8.2	Historical grown governance.....	176
6.1.8.3	Pure Logistics City-Cluster governance.....	177
6.1.8.4	Concluding the ‘Governance’ category.....	181
6.2	CONCLUSION.....	182

## CHAPTER 7

### **DELPHI ROUND II: EXPLICATION OF INFLUENCE CATEGORIES ..... 184**

7.1	THE ROLE OF INFLUENCES ON THE ‘ENABLER CATEGORIES’.....	184
7.2	POLITICAL INFLUENCE ON THE ENABLERS.....	185
7.2.1	<i>The role of politics for the market enabler</i> .....	185
7.2.2	<i>The role of politics for the infrastructure enabler</i> .....	187
7.2.3	<i>The role of politics for the service enabler</i> .....	188
7.2.4	<i>The role of politics for the workforce enabler</i> .....	190
7.2.5	<i>The role of politics for the knowledge enabler</i> .....	192
7.2.6	<i>The role of politics for the capital enabler</i> .....	194
7.2.7	<i>The role of politics for the competition enabler</i> .....	195
7.2.8	<i>The role of politics for the governance enabler</i> .....	198
7.2.9	<i>Concluding the influence of ‘Politics’</i> .....	199
7.3	THE INFLUENCE OF GEOGRAPHY ON THE BASE AND FUNCTIONAL ENABLERS.....	200
7.3.1	<i>Geography as an accessibility factor to the markets</i> .....	201
7.3.1.1	Proximity to the markets as an accessibility factor.....	201
7.3.1.2	Topographical conditions as an accessibility factor.....	203
7.3.2	<i>Geography and its influence on the functional enablers</i> .....	204
7.3.3	<i>Geography a past-dependent factor</i> .....	205
7.3.4	<i>Concluding the influence of ‘Geography’</i> .....	207
7.4	CONCLUDING THE ‘INFLUENCE’ CATEGORY.....	208

## CHAPTER 8

### **DELPHI ROUND II: EXPLICATION OF THE IMPACTS ON THE REGION ..... 210**

8.1	THE IMPACT OF A LOGISTICS CITY-CLUSTER ON THE REGION.....	210
8.2	THE ECONOMIC IMPACT.....	211
8.2.1	<i>The significance of employment opportunities</i> .....	212
8.2.2	<i>The importance of value-add for the region</i> .....	214
8.2.3	<i>Tax and duties as revenue originators for authorities</i> .....	215
8.2.4	<i>Income for the workforce</i> .....	217
8.2.5	<i>Concluding the ‘Economic’ impact category</i> .....	218

8.3	THE ENVIRONMENTAL IMPACT .....	219
8.3.1	<i>The challenge of pollution</i> .....	219
8.3.2	<i>Land use and destruction</i> .....	221
8.3.3	<i>The effects of noise, odour and visual appearance</i> .....	222
8.3.4	<i>Rising awareness of negative environmental impact</i> .....	223
8.3.5	<i>Current activities to reduce environmental degradation</i> .....	225
8.3.6	<i>Concluding the ‘Environment’ impact category</i> .....	229
8.4	THE SOCIAL IMPACT.....	230
8.4.1	<i>The effects on liveability</i> .....	231
8.4.2	<i>Material well-being and work related impact</i> .....	233
8.4.3	<i>Interconnectedness of the community</i> .....	235
8.4.4	<i>Concluding the ‘Social’ impact category</i> .....	238
8.5	CONCLUDING THE IMPACT CATEGORY.....	239

## CHAPTER 9

### **VALIDATION OF THE LOGISTICS CITY-CLUSTER FRAMEWORK..... 241**

9.1	INTRODUCTION: THE ANALYSING LOGIC OF ROUND III.....	241
9.2	VALIDATION OF THE CONCEPTUAL LOGISTICS CITY-CLUSTER DESCRIPTION .....	242
9.3	VALIDATION OF THE FRAMEWORK .....	243
9.3.1	<i>Validation of the enabler categories</i> .....	244
9.3.1.1	The market base enabler .....	244
9.3.1.2	The infrastructure enabler.....	247
9.3.1.3	The service enabler.....	251
9.3.1.4	The workforce enabler.....	254
9.3.1.5	The knowledge enabler .....	258
9.3.1.6	The capital enabler.....	262
9.3.1.7	The competition enabler.....	266
9.3.1.8	The governance enabler .....	271
9.3.2	<i>Validation of the influence categories</i> .....	275
9.3.2.1	Analysis of the political influence .....	275
9.3.2.1.1	Influence on market size and quality .....	276
9.3.2.1.2	Influence on the infrastructure .....	277
9.3.2.1.3	Influence on the service enabler.....	278
9.3.2.1.4	Influence on the workforce enabler .....	279
9.3.2.1.5	Influence on the knowledge enabler.....	281
9.3.2.1.6	Influence on the capital enabler.....	282
9.3.2.1.7	Influence on the competition enabler .....	283
9.3.2.1.8	Influence on the governance enabler .....	284
9.3.2.1.9	General notions on the political influence.....	285
9.3.2.2	Analysis of the geographical influence.....	286
9.3.3	<i>Validation of the impact categories</i> .....	290
9.3.3.1	Analysis of the economic impact category .....	290
9.3.3.1.1	Employment opportunities .....	290
9.3.3.1.2	Importance of value-add.....	291
9.3.3.1.3	Income for governments and the workforce .....	292
9.3.3.1.4	General notion of the economic impact category .....	294
9.3.3.2	Analysis of the environmental impact category .....	294
9.3.3.2.1	The effects of logistics activities on the environment.....	294
9.3.3.2.2	Rising awareness of negative environmental impact.....	297
9.3.3.2.3	Activities to reduce negative environmental impact .....	298
9.3.3.2.4	General notion of the environmental impact category.....	301

9.3.3.3	Analysis of the social impact.....	302
9.3.3.3.1	Effects on the liveability factors .....	302
9.3.3.3.2	Material well-being and work related impact .....	305
9.3.3.3.3	Interconnectedness of the community.....	306
9.3.3.3.4	General notion of the social impact category .....	309
9.4	CONCLUDING DELPHI ROUND III .....	310

## CHAPTER 10

<b>IMPLICATIONS AND FURTHER RESEARCH OPPORTUNITIES.....</b>	<b>316</b>
10.1 INTRODUCTION .....	316
10.2 A PRECISE UNDERSTANDING OF LOGISTICS CITY-CLUSTERS.....	317
10.3 THE LOGISTICS CITY-CLUSTER FRAMEWORK.....	318
10.3.1 <i>The enabler categories and influential factors - Implications.....</i>	320
10.3.1.1 The market base enabler .....	322
10.3.1.2 The infrastructure enabler.....	323
10.3.1.3 The service enabler.....	325
10.3.1.4 The workforce enabler.....	326
10.3.1.5 The knowledge enabler .....	327
10.3.1.6 The capital enabler.....	329
10.3.1.7 The competition enabler.....	330
10.3.1.8 The integrating governance enabler.....	331
10.3.2 <i>The impact categories - Implications.....</i>	333
10.3.2.1 Economic impact.....	334
10.3.2.2 Environment impact .....	336
10.3.2.3 Social impact.....	338
10.4 SIGNIFICANCE AND KNOWLEDGE CLAIMS OF THIS RESEARCH .....	339
10.5 LIMITATIONS OF THE STUDY AND SUGGESTION FOR FURTHER RESEARCH .....	341
<b>LIST OF REFERENCES .....</b>	<b>343</b>
<b>APPENDIX 1: ROUND II - INTERVIEW INFORMATION PACKAGE .....</b>	<b>371</b>
<b>APPENDIX 2: ROUND II - CERTIFICATION OF ACCREDITED TRANSLATION....</b>	<b>372</b>
<b>APPENDIX 3: ROUND III - SURVEY .....</b>	<b>373</b>

## LIST OF FIGURES

Figure 1.3-1: The research design.....	7
Figure 1.5-1: Thesis structure.....	9
Figure 2.2-1: Progressions of logistics nodes.....	29
Figure 2.2-2: First insight of Logistics City-Clusters .....	30
Figure 2.3-1: Notions of the ‘Neo-Classic Economic Theory’ .....	38
Figure 2.3-2: The strategic ‘Diamond Framework’.....	40
Figure 2.4-1: Sustainable development – The ‘Triple Bottom Line’ approach.....	49
Figure 3.2-1: Aggregation of research design approaches.....	61
Figure 4.1-1: The preliminary Logistics City-Cluster framework.....	88
Figure 4.2-1: The core elements of the initial ‘Enabler’ category.....	89
Figure 4.2-2: The preliminary ‘Infrastructure’ enabler.....	91
Figure 4.2-3: The preliminary ‘Service’ enabler.....	93
Figure 4.2-4: The preliminary ‘Skilled Workforce’ enabler.....	93
Figure 4.2-5: The preliminary ‘Proximate Demand’ enabler.....	94
Figure 4.2-6: The preliminary ‘Stakeholders’ enabler.....	95
Figure 4.2-7: The preliminary ‘Governance and Policy’ enabler.....	96
Figure 4.2-8: The integrated ‘Enabler’ category of the preliminary framework.....	97
Figure 4.3-1: The core elements of the ‘Scope’ category.....	98
Figure 4.3-2: The preliminary ‘Economic’ scope category.....	99
Figure 4.3-3: The preliminary ‘Environmental’ scope category.....	100
Figure 4.3-4: The preliminary ‘Social’ scope category.....	102
Figure 4.3-5: The integrated ‘Scope’ category of the preliminary framework.....	102
Figure 5.3-1: The elaborated Logistics City-Cluster framework.....	117
Figure 6.1-1: The elaborated ‘Enabler’ category.....	118
Figure 6.1-2: The ‘Market’ category and its properties.....	127
Figure 6.1-3: The ‘Infrastructure’ category and its properties.....	136
Figure 6.1-4: The ‘Service’ category and its properties.....	145
Figure 6.1-5: The ‘Workforce’ category and its properties.....	152
Figure 6.1-6: The ‘Knowledge’ category and its properties.....	159
Figure 6.1-7: The ‘Capital’ category and its properties.....	166
Figure 6.1-8: The ‘Competition’ category and its properties.....	174
Figure 6.1-9: The ‘Governance’ category and its properties.....	182
Figure 7.1-1: The influential factors of politics and geography.....	184
Figure 7.2-1: Politics as an influential factor.....	200
Figure 7.3-1: Geography as s an influential factor.....	208

Figure 8.1-1: The impact categories and its sub-segments.....	210
Figure 8.1-2: The application of the impact analysis .....	211
Figure 8.2-1: The ‘Economic’ impact category .....	219
Figure 8.3-1: The ‘Environmental’ impact category .....	230
Figure 8.4-1: The ‘Social’ impact category .....	239
Figure 9.1-1: Analysing logic .....	242
Figure 9.2-1: Results – Conceptual description.....	243
Figure 9.3-1: Results – Structure of the Logistics City-Cluster framework .....	244
Figure 9.3-2: Results – Structure of the enabling category .....	244
Figure 9.3-3: Results – Market segmentation and location .....	245
Figure 9.3-4: Results – Market size and quality.....	246
Figure 9.3-5: Results – Market ‘Enabler’ .....	246
Figure 9.3-6: Results – Transport and gateway infrastructure.....	247
Figure 9.3-7: Results – Land allocation, innovation and quality .....	248
Figure 9.3-8: Results – ICT infrastructure.....	249
Figure 9.3-9: Results – Social infrastructure.....	250
Figure 9.3-10: Results – Infrastructure ‘Enabler’ .....	251
Figure 9.3-11: Results – Logistics higher and lower value-add activities .....	251
Figure 9.3-12: Results – Outsourcing and supporting activities .....	252
Figure 9.3-13: Results – Importance of core activities.....	253
Figure 9.3-14: Results – Service ‘Enabler’ .....	254
Figure 9.3-15: Results – Segmentation of the workforce ‘Enabler’.....	254
Figure 9.3-16: Results – Scarcity of the workforce .....	255
Figure 9.3-17: Results – Addressing scarcity of the workforce.....	256
Figure 9.3-18: Results – Proximity of the workforce .....	257
Figure 9.3-19: Results – Workforce ‘Enabler’ .....	258
Figure 9.3-20: Results – Role of knowledge creation.....	258
Figure 9.3-21: Results – Private role in knowledge creation .....	259
Figure 9.3-22: Results – Public role in knowledge creation.....	260
Figure 9.3-23: Results – Collaboration to innovate.....	261
Figure 9.3-24: Results – Knowledge ‘Enabler’.....	262
Figure 9.3-25: Results – Private and public role in accessibility of capital .....	263
Figure 9.3-26: Results – Accessibility of capital for logistics operations.....	263
Figure 9.3-27: Results – Accessibility of capital for infrastructure investments.....	264
Figure 9.3-28: Results – Capital ‘Enabler’ .....	265
Figure 9.3-29: Results – Classification of the competition ‘Enabler’.....	266
Figure 9.3-30: Results – Intra-competition of trade gateways .....	267

Figure 9.3-31: Results – Intra-competition of logistics service provider .....	268
Figure 9.3-32: Results – Inter-competition of trade gateways .....	269
Figure 9.3-33: Results – Inter-competition of logistics service provider .....	270
Figure 9.3-34: Results – Interdependency of proximity and inter-competition.....	270
Figure 9.3-35: Results – Competition ‘Enabler’ .....	271
Figure 9.3-36: Results – Necessity of governance .....	271
Figure 9.3-37: Results – Current strategic logistics planning .....	272
Figure 9.3-38: Results – LC-C governance and its requirements.....	273
Figure 9.3-39: Results – Focus of a governance model .....	274
Figure 9.3-40: Results – Governance ‘Enabler’ .....	275
Figure 9.3-41: Results – Setup of influence categories .....	275
Figure 9.3-42: Results – Political influence on market size and quality .....	276
Figure 9.3-43: Results – Political influence on infrastructure.....	277
Figure 9.3-44: Results – Political influence on the service enabler .....	278
Figure 9.3-45: Results – Political influence on the workforce enabler .....	279
Figure 9.3-46: Results – Political influence on the knowledge enabler .....	281
Figure 9.3-47: Results – Political influence on the capital enabler .....	282
Figure 9.3-48: Results – Political influence on the competition enabler .....	283
Figure 9.3-49: Results – Political influence on the governance enabler .....	285
Figure 9.3-50: Results – General notions on political influence.....	285
Figure 9.3-51: Results – Political Influence on the enabler categories.....	286
Figure 9.3-52: Results – Geography as a market accessibility factor.....	286
Figure 9.3-53: Results – Proximity to market as an accessibility factor.....	287
Figure 9.3-54: Results – Topographical conditions as an accessibility factor .....	288
Figure 9.3-55: Results – Geography’s influence on the functional enablers .....	288
Figure 9.3-56: Results – Geography a past dependent factor.....	289
Figure 9.3-57: Results – The influence of geography on the enablers .....	289
Figure 9.3-58: Results – Structure of the impact category .....	290
Figure 9.3-59: Results – The pre-eminence of employment opportunities .....	291
Figure 9.3-60: Results – The importance of value-add.....	291
Figure 9.3-61: Results – Tax and duties as government revenue .....	292
Figure 9.3-62: Results – Generating income for the workforce .....	293
Figure 9.3-63: Results – The economic impact category .....	294
Figure 9.3-64: Results – The impact of pollution .....	294
Figure 9.3-65: Results – Environmental degradation due to land use.....	295
Figure 9.3-66: Results – Effects of noise, odour and visual appearance .....	296
Figure 9.3-67: Results – Rising awareness of negative environmental impact .....	297

Figure 9.3-68: Results – Approaches reducing environmental degradation .....	298
Figure 9.3-69: Results – Activities to reduce pollution .....	299
Figure 9.3-70: Results – Activities to reduce land degradation .....	300
Figure 9.3-71: Results – Activities to reduce noise, odour and visual effects.....	301
Figure 9.3-72: Results – The environmental impact category .....	302
Figure 9.3-73: Results – Environmental hazards and its effect on liveability.....	302
Figure 9.3-74: Results – Social infrastructure and its effect on liveability.....	303
Figure 9.3-75: Results – Transport infrastructure and its effect on liveability .....	304
Figure 9.3-76: Results – Income and its effect on material well-being .....	305
Figure 9.3-77: Results – Working conditions and its effect on well-being .....	306
Figure 9.3-78: Results – Local community belonging and identification.....	306
Figure 9.3-79: Results – Trust and influence of the community .....	307
Figure 9.3-80: Results – Increased international character .....	308
Figure 9.3-81: Results – The social impact category.....	309
Figure 10.2-1: Conceptual understanding of the Logistics City-Cluster.....	318
Figure 10.3-1: The Logistics City-Cluster framework.....	319
Figure 10.3-2: The dynamic character of the enablers and influential factors .....	321
Figure 10.3-3: The path of Logistics City-Cluster in regards to sustainability.....	334

## LIST OF TABLES

Table 2.2-1: Infrastructure and service elements of ‘Freight Villages’ .....	14
Table 2.2-2: Elements of ‘Inland Ports’ .....	17
Table 2.2-3: Logistics Cities Zones – Lingang, Dubai and Manila .....	21
Table 2.3-1: Analysis of theoretical approaches I .....	32
Table 2.3-2: Analysis of theoretical approaches II .....	33
Table 2.3-3: Analysis of theoretical approaches III .....	33
Table 2.3-4: Analysis of theoretical approaches IV .....	34
Table 2.3-5: Derived classification of cluster theories .....	34
Table 2.3-6: The underlying determinants of clustering.....	44
Table 2.4-1: The core notions of the three dimensions .....	56
Table 3.2-1: Synonyms for the main research paradigms .....	61
Table 3.3-1: The five core principles of ‘Symbolic Interaction’ .....	64
Table 3.4-1: Possible research methodologies.....	65
Table 3.4-2: Pragmatic aims of ‘Delphi-Studies’ .....	67
Table 3.4-3: Sampling framework.....	70
Table 3.4-4: Participants’ selection criteria .....	71
Table 3.5-1: Five applied interview rules .....	74
Table 3.5-2: Round I sampling: Coastal Logistics City-Clusters.....	75
Table 3.5-3: The five steps of ‘Content Analysis’ .....	76
Table 3.5-4: Round II sampling: Inland Logistics City-Clusters .....	79
Table 3.5-5: Round II sampling: Coastal Logistics City-Clusters.....	79
Table 3.5-6: Content of the interview information package .....	80
Table 3.5-7: Coding process.....	81
Table 3.5-8: Likert-Scale voting dimension.....	83
Table 3.5-9: Round III sampling.....	84
Table 9.4-1 Confirmation and contestation of the enabler properties.....	310
Table 9.4-2 Confirmation and contestation of the influence properties .....	312
Table 9.4-3 Confirmation and contestation of the impact properties .....	314

## LIST OF ABBREVIATIONS

AGV	Automated Guided Vehicles
DC	Distribution Centre
DLC	Dubai Logistics City
DTC	Dense Trade Cluster
DWC	Dubai World Central
EDC	European Distribution Centre
EU	European Union
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GGLC	Global Gateway Logistics City
HQ	Headquarter
ICT	Information and Communication Technology
ILSCM	Institute for Logistics and Supply Chain Management
IQR	Inter Quartile Range
JIS	Just-in-Sequence
JIT	Just-in-Time
LC-C	Logistics City-Cluster
LSP	Logistics Service Provider
MIT	Massachusetts Institute of Technology
PPP	Public Private Partnership
PR	Public Relations
R&D	Research and Development
RFID	Radio Frequency Identification
SECA	Sulphur Emission Controlled Area
SME	Small and Medium Enterprises
SOA	Service Oriented Architecture
UAE	United Arab Emirates
UNCSD	The United Nations Commission on Sustainable Development
WCED	World Commission on Environment and Development

# Chapter 1

## Introduction

### 1.1. Background and context

With increasing levels of globalisation, the rapid development of transport technology and the worldwide enlargement of markets, economic competition between regions and countries has expanded dramatically in recent years (Capineri & Leinbach, 2006; Leinbach & Bowen, 2005). As a result, the favourable location of a region in terms of the connectivity of one economy to another, in regards to sourcing and distribution, has been seen to play an important role in determining its ability to participate in emergent globalisation opportunities. Thus, the logistical setup and the associated global connectivity of a metropolitan area and of its related industries, together with its ability to retain and further develop its 'competitive advantage', requires a significant review of the way in which many regions interface with world markets.

The connectivity provided by one economy to another through physical trade gateways, is often historically embedded in the regional demand for importing and exporting goods (Notteboom & Rodrigue, 2009). However, simple import / export transshipment connections have evolved over the last decades through more complex 'Hub-and-Spoke' systems to logistics centre gateways (ESCAP, 2005; Abrahamsson et al., 2003). This move towards logistics centre gateways includes the development of logistics supporting value-add business services and related social aspects (Sengpiehl et al., 2008a), and in this context, it is important to briefly address the core factors that have influenced these evolutionary changes.

It is argued that progress in '*trade liberalisation*' through the reduction of trade tariffs and trade barriers as an outcome of 'Free Trade Agreements' (FTA) and 'Free Trade Zones' (FTZ), has been the impetus for companies to focus on distinctive logistics management and related systems (Rimiene & Grundey, 2007). As a result, a new global-oriented production structure and significant developments in '*transport technology*' have surfaced (ESCAP, 2009; Coe et al., 2004). For instance, the emergence of the container as a transport unit in the 1960s was a major technological revolution (Rodrigue, 2008), and the consequent reduction in transshipment times has made transportation of all types of goods more economical. This has led to

concentration of trade and the development of large logistics locations as part of the emergent 'Hub-and-Spoke' network (Capineri & Leinbach, 2006). Further, '*Information and Communication Technology*' (ICT) has rapidly advanced and become firmly integrated in transport and logistics services, whilst its importance and influence is continually increasing (Lemoine & Dagnaes, 2003). E-commerce based administration and e-commercial services have multiplied efficiency by reducing redundant information and enhancing visibility within the whole supply chain, leading to better operations and reduced cost (Grozniak, 2008). This integration of ICT has also taken place in trade nodes and increased their competitiveness (Srouf et al., 2008). Development in trade liberalisation, transport and information technology are advancing steadily, and as a consequence, '*new business practices*' have emerged (ESCAP, 2005; Schmitz & Gentry, 2000). For example, global companies now tend to concentrate production facilities in particular regions, leaving business opportunities, such as customizing and light manufacturing, in other regions due to heterogeneous markets (Van der Lugt & de Langen, 2005). Consequently, business strategies such as centralized inventory, delayed configuration or light assembly, customising and quality control have emerged (Abrahamsson et al., 2003).

These forces and associated evolution led to a high concentration of logistics activities in relatively few gateways that have access to major markets (Notteboom & Rodrigue, 2009). However, it appears that this engagement in the global trading arena and the resulting trade hub's concentration of logistics activities, commonly in metropolitan areas, can cause congestions and bottlenecks, which decrease the seamlessness of connectivity and put regions under enormous pressure (Capineri & Leinbach, 2006). Therefore, new strategies are required to develop well-structured and sustainable solutions to support industrial and commercial activities within a region that has efficient connectivity to other economic localities. In this context, one essential issue is the alignment of activities and regulations across traditional boundaries to enable logistics centre gateways to connect a region via physical, virtual and legal interfaces to the rest of the world (Sengpiehl et al., 2008b). Indeed, one strategy which can address these changes is seen as the Logistics City-Cluster concept, which is one of the latest manifestations of logistics centre gateways (e.g. Nagel et al., 2009a; ILSCM, 2007a; Lingang Group, 2006).

The concept of a Logistics City-Cluster is relatively new in the global economy and broadly represents a geographical metropolitan area containing a number of logistics nuclei, one of which is a massive international freight hub, that are associated with a

critical amount of multimodal transport and gateway infrastructure. A Logistics City-Cluster has embedded urban constructs such as specific logistics-oriented education or research facilities and social amenities. Hence, the main function of the Logistics City-Cluster is to provide a logistical platform to accompany appropriate logistics infrastructure and physical facilities (e.g. roads, rail tracks, terminals and ICT) and substantial existing logistics services (e.g. warehousing, distribution and freight forwarding). However, related business value-add services (e.g. legal or finance) and social infrastructure (e.g. education and recreation) are necessary elements for the Logistics City-Cluster in terms of it being an independent and sustainable entity. This formulation is alternatively referred to as a 'Logistics Cluster', 'Harbour City', 'Port City' or, more recently, as a 'Logistics City' (Sengpiehl et al., 2008b).

Whilst the naming itself appears to be contested, Logistics City-Clusters have gained acceptance as representing a viable and unique concept, as is shown by recent developments in Dubai, Lingang, Singapore, Hamburg, Rotterdam, Zaragoza and Duisburg. There is, however, an absence of an academically-founded conceptual description which adequately identifies its distinct characteristics and necessary contributing elements. Additionally, current literature lacks the ability to explicitly describe how the elements of a Logistics City-Cluster both strengthen and impact on the region. The emergence of this concept makes it imperative that a scientific knowledge base is elaborated to ensure orderly and efficient development of Logistics City-Clusters, and to understand the nature of the constituting elements in order to assess its potential as a sustainable regional strategy.

The Institute for Logistics and Supply Chain Management (ILSCM) in Melbourne, Australia, in which this investigation was carried out, focuses its research around the emerging Logistics City-Cluster concept. This research program has five framework subcategories: (i) context, (ii) infrastructure, (iii) information technology, (iv) sustainability and (iv) policy / governance. The proposed research study is part of this wider contextual framework and will begin to close the knowledge gap in the area of a Logistics City-Cluster to enhance emergent globalisation opportunities. The study is designed to investigate a Logistics City-Cluster's core enabling elements, its characteristics and influencing factors, and to finally assess its effects on the associated region. This knowledge base will be compiled to provide an elaborated Logistics City-Cluster framework, grounded in the thinking, actions and experience of selected key informants in this field.

The outcome is likely to have significance for practical developments of Logistics City-Clusters. Stakeholders, such as governmental development departments, logistics cluster initiatives and logistics operators, will have a better understanding of Logistics City-Clusters enablers, influential factors and the nature of their dynamic relationships. It is anticipated that the resulting holistic framework and its elements will provide a generic tool-kit that can be transformed or adapted for regional needs to support decision-making for investments in specific enabling elements, such as infrastructure and operational services, when developing or modifying existing clusters. Further, the assessment of the effects of the Logistics City-Cluster on the region as a holistic system will provide practitioners with an appreciation of the likely outcomes of introducing this strategy to their particular metropolitan area. The framework is also significant from an academic perspective. Because there is a paucity of available literature regarding the notion of Logistics City-Clusters, this study will contribute significantly to the knowledge base of this emerging concept and will provide a sophisticated base for future qualitative and quantitative research in this area.

## **1.2. Research objectives**

Whilst the concept of a Logistics City-Cluster is accepted as a unique concept and is currently being planned and developed, the body of knowledge of this regional development strategy, thus its composition, characteristics and actual effects on the region, is still fragmented and very limited. Consequently, the objective of this study is to enrich this knowledge by developing a framework that draws from both cluster theories and the practical experience of senior practitioners associated with leading Logistics City-Clusters. This framework will provide a knowledge base for a better understanding of the phenomenon and represents a first step in filling the gap in our understanding of the unique elements and value propositions of Logistics City-Clusters and their behaviour towards regional development. Accordingly, the general aims of the research objective are:

- to explore Logistics City-Clusters in the context of their characteristics and elements as well as their distinguishing attributes;
- to identify the scope and therefore effects of Logistics City-Clusters in the context of regional development;
- to correlate informed judgements on both these topics spanning a wide range of disciplines and locations to achieve a holistic understanding; and
- to compile and comprise a new body of knowledge into a framework that has a rich explanatory as well as descriptive expressiveness.

These research aims led to three main research questions. To provide a comprehensive and elaborated answer to these questions, a number of subsequent questions are necessary. The research questions and their sub-questions are:

**1. How can the Logistics City-Cluster concept be defined as an integrated logistics platform and clearly distinguished from other existing logistics type structures?**

**2. Which are the core determinants of Logistics City-Clusters and how are these influenced by external factors?**

How can the common enabling elements of the concept be described?

How do the enabling elements interact?

How do external factors influence these enabling elements?

**3. Does the Logistics City-Cluster, as a regional development strategy, provide a sustainable system?**

How might the concept impact on the economic aspect of the region?

How might the concept impact on the regional environment?

How might the concept impact on the social aspects of the region it serves?

Because of the limited literature and inherently subjective nature of the conceptual environment, the research will be of exploratory nature and will have an inductive, interpretive and iterative character. Consequently, it will not commence with a formal hypothesis to be tested, as it is common for classical deductive research (Glaser, 2007; O'Leary, 2004, Sarantakos, 1998). The chosen research paradigm, methodology and methods that will underpin the exploratory nature of the investigation will be introduced in the next section.

### **1.3. Research paradigm, methodology and methods**

The notion of a Logistics City-Cluster is currently being developed in a number of areas in response to specific contexts, experiences and economic needs of diverse stakeholders. Whilst there is clearly a subjective dimension to meanings and understandings about this concept that may vary according to an individual's unique perception, key players in the Logistics City-Cluster field are conjointly aware of other positions and opinions which can provide a base level of agreement. It is this potential for a shared level of opinion which suggests that a constructivist theory of knowledge is appropriate as the underpinning epistemological position for this investigation. Whilst 'Constructivism' rejects the view that there is a single objective truth waiting to be discovered, it holds that truth and meaning are developed *in concert* by the various social actors (subjects) that are most intimately involved with the concept (object) under review (Crotty, 1998). Considering the intense interaction of various stakeholders in the Logistics City-Cluster area, the theoretical approach of 'Interpretivism',

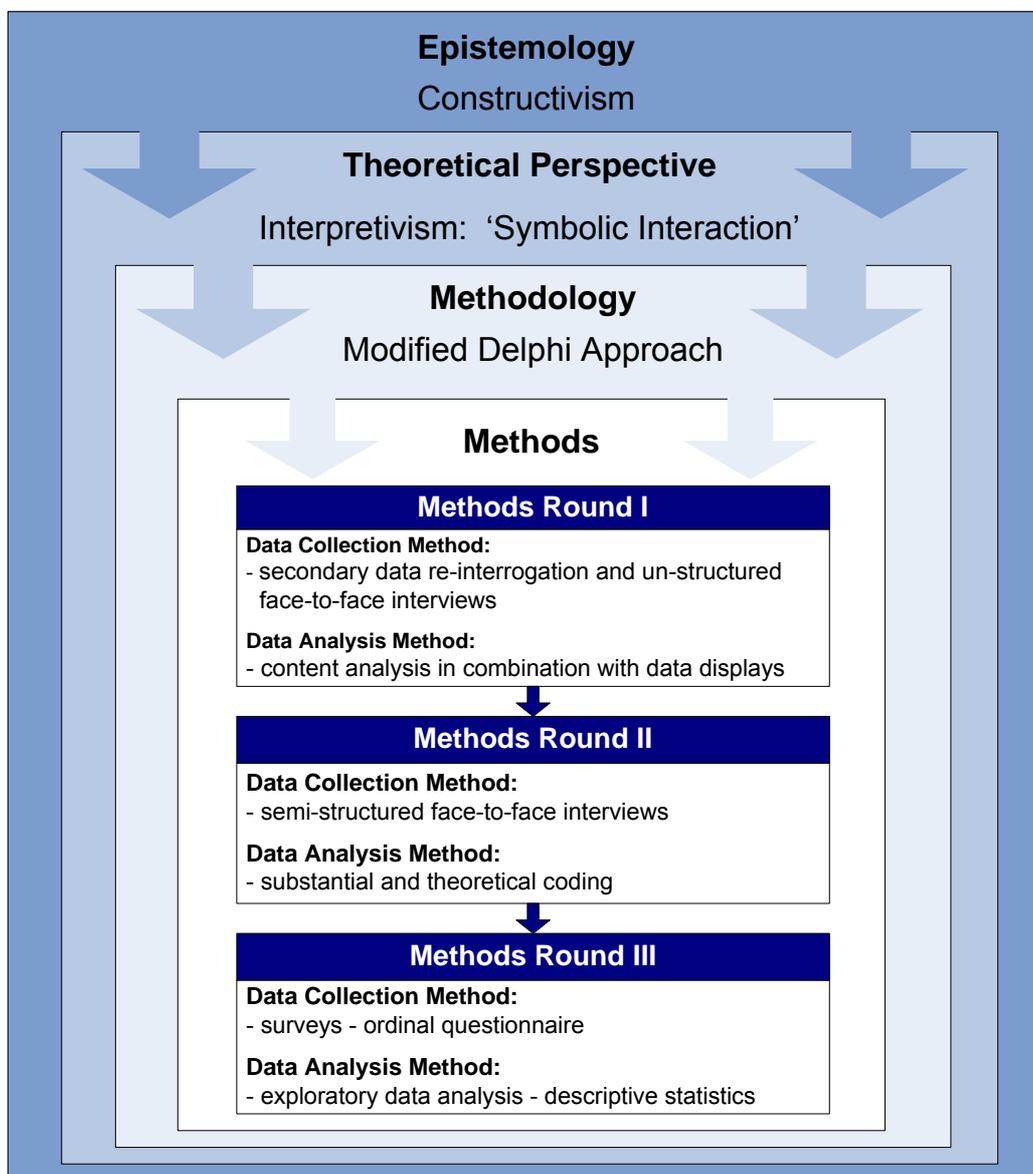
particularly that of 'Symbolic Interaction', is an appropriate choice. The principles of this theoretical perspective are underpinned by constructivist epistemology, which demands that methodologies and methods need to be chosen that allow individuals to freely express their perceptions (Robson, 2002).

There are several methodologies that are consistent both with the general tenets of constructivism and the more detailed principles of symbolic interaction. The modified Delphi approach (e.g. Hsu & Sandford, 2007; Landeta, 2006; van Zolingen & Klaassen, 2003) appeared to be the most appropriate methodology for exploration of the concept and its underlying assumptions to allow valid and rigorous contributions to the research questions. One of the main reasons is that this methodology is suitable for exploratory research in which variables are already partially developed and that it draws on the current understanding of experts to update and enhance scientific knowledge (Engels & Kennedy, 2007; Cottam et al., 2004; Hwang, 2004). Additionally, the modified Delphi methodology has the ability to apply multiple methods, both qualitative and quantitative, which strengthens the research outcomes (Powell, 2003). This approach further provides anonymity for the participants, which reduces the risks of bias and peer pressure, and has the ability to be flexible in terms of the sampling, which supports the multi-method approach of this investigation (Islam, 2005; Meyrick, 2003). The modified Delphi approach has been applied in various aspects in logistics research, and is nowadays widely accepted in this field (e.g. Keebler & Plank, 2009; Boone et al., 2008; Wu & Cheng, 2007; Islam et al., 2006).

The modified Delphi methodology always employs multiple iterations (Hasson et al., 2000). For this investigation, three successive rounds have been decided as suitable to both collect the major notions and to reach a rich description and to enable unforced consensus on most issues, whilst still leaving space for exploration of divergent ideas. The three iterations apply specific data collection and data analysis methods, which are chosen appropriately for the stages and circumstances of the research (Hsu & Sandford, 2007; Ludwig, 1994).

In *Round I*, a re-interrogation of the relevant literature as a secondary data-collection was conducted in conjunction with two unstructured interviews with eminent practitioners of the world class Logistics City-Clusters of Dubai and Singapore. Content analysis was applied at this stage, allowing the development of a preliminary framework upon which the second iteration was based. *Round II* applied intensive semi-structured face-to-face interviews to assess the preliminary model. The

purposefully selected informants held significant positions of responsibility in leading Logistics City-Clusters in Europe, and the interviews were analysed by applying substantial and theoretical coding methods. As a result, an amended elaborated Logistics City-Cluster model was prepared. The major findings have been transformed and summarised into statements, which provided the foundation for the third iteration. *Round III* applied a more traditional Delphi data collection and analysis method. The derived statements of the elaborated framework were presented to the experts that participated in the earlier iterations plus additional eminent practitioners of world class Logistics City-Clusters, via an ordinal questionnaire. These experts were asked to validate the emergent notions and were given the opportunity to clarify their ratings. The resulting data were evaluated by using descriptive statistics with emphasis on central tendency and level of dispersion. Figure 1.3-1 summarises the research design.



**Figure 1.3-1: The research design**

## **1.4. Significance of the study**

Since the phenomenon of a Logistics City-Cluster is an emerging concept, relatively little commentary is available in the literature to guide practitioners in the area. Therefore, this research will provide a significant contribution to knowledge by enhancing the current understanding of the phenomenon of a Logistics City-Cluster through the identification of common enabling elements which are structured to represent their relationships and interaction. Additionally, this research will enable insight in the core external influential factors impinging on the enabling systems and develop a comprehensive understanding of the impact of a Logistics City-Cluster on its region. It is anticipated that this knowledge base, grounded in the thinking, actions and experiences of executive experts in this area, will provide a set of relationships between the core categories and their inherent properties that offers a holistic and widely applicable explanation of the Logistics City-Cluster concept.

This research is designed to be significant in a macro perspective for stakeholders that govern, participate in the development of, or invest in, a Logistics City-Cluster. It will provide practitioners or academics with the potential to appreciate the possible setup and important elements of a Logistics City-Cluster and can increase the awareness of likely outcomes affecting the region, when adapted to alternative contexts. Consequently, because of this comprehensive understanding of the general concept, the potential to improve the quality and effectiveness of Logistics City-Clusters and its possible regional strengths can be exploited more efficiently. The core significance is that it demonstrates that the Logistics City-Cluster concept is a holistic system, based on categories which have a dynamic relationship. Indeed, possible elements cannot be dealt with separately when attempting to achieve sustainable growth within a region; therefore an examination of all elements are required in order to estimate the overall effects of a Logistics City-Cluster. In this way, the framework can be used as a generic planning tool, which can be adapted to regional needs when developing or modifying a Logistics City-Cluster.

Whilst elevation of this restricted generated knowledge base to a more formal knowledge base which has a much broader application must be subject of further research, this knowledge base developed here is important as it can unlock so called 'comebacks' and 'left outs' providing the intellectual space for future research (Glaser, 2007). The 'comebacks' are subcategories of the knowledge base that could be a subject of their own study focusing on the subtleties of a related behaviour relationship,

while the 'left outs' are defined as omitted aspects of the study that readers can identify due to their own experience and knowledge. The importance of the current research, therefore, is that it provides systematic and complex details of the phenomenon of Logistics City-Clusters, which can be used to underpin further qualitative or quantitative research into specific sites.

## 1.5. Structure of the Thesis

In this first chapter, the background and context upon which the research on the concept of a Logistics City-Cluster was initiated has been described, and an outline of the research objectives, the overall research design and the significance of the results presented. The thesis, structured according to the research design in Figure 1.5-1, is briefly described below.

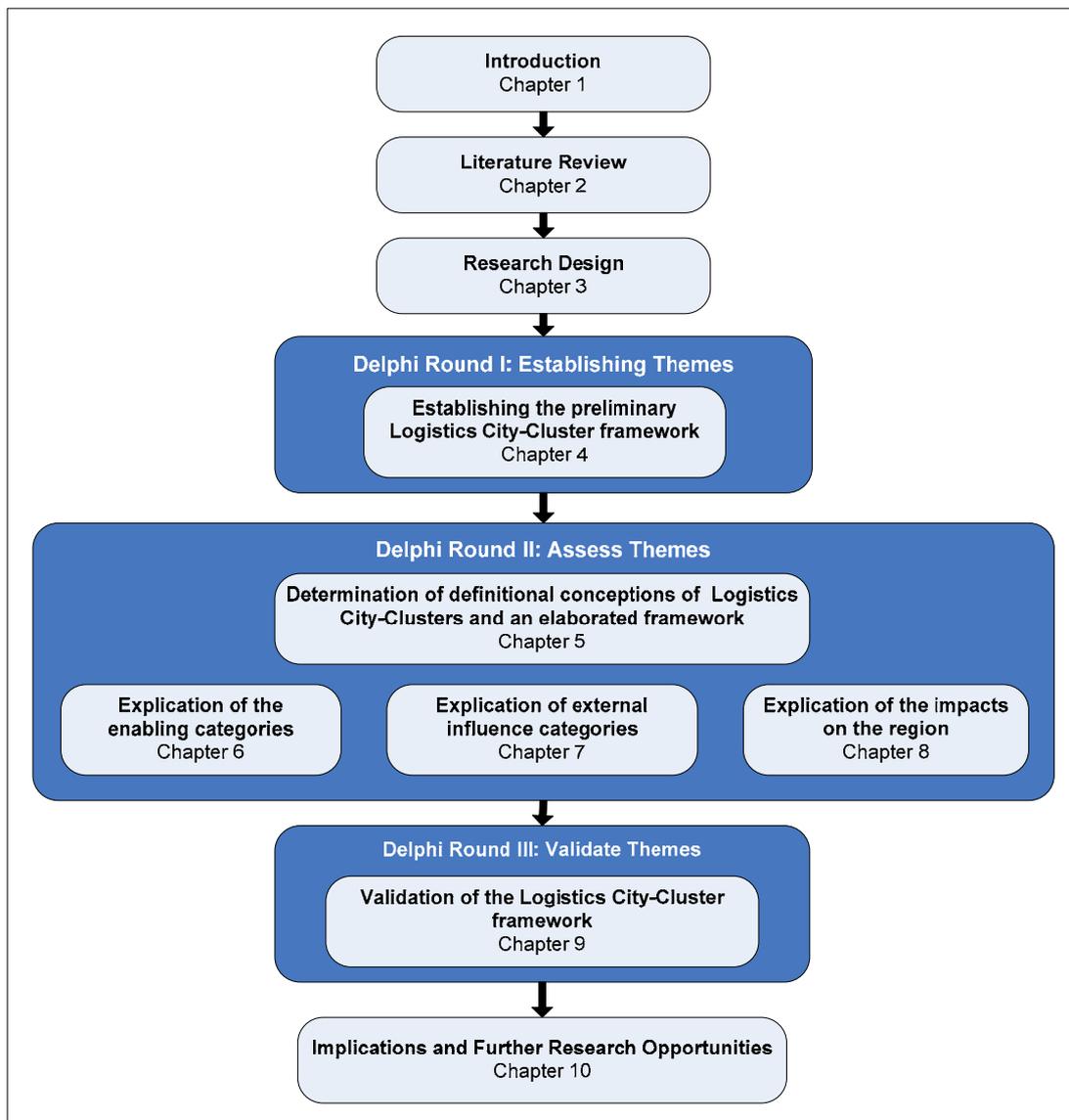


Figure 1.5-1: Thesis structure

Chapter 2 contains the literature review, which has helped to shape the research objectives and has guided the preliminary development of the Logistics City-Cluster framework. It presents a comprehensive review of literature associated with logistics agglomerations, including a review on the evolution of logistics nodes describing the emergence of Logistic City-Clusters. This initial work led to two further topics that needed to be considered for review: first, a comprehensive literature investigation on different cluster theories that have informed this study with possible variables needed to form agglomerations; and second, a review and discussion on sustainability.

The research design and its associated paradigm, methodology, data collection and analysis methods are detailed in Chapter 3. The positioning of the investigation within the epistemological and theoretical perspective is discussed and justified. This reflection leads to the selection of the modified Delphi methodology, where its key principles are considered within the context of the research objectives. The application of three iterative rounds of investigations using a multi-method strategy for data-collection and analysis is explained and its applicability comprehensively argued.

Round I, in which the themes of this investigation have been established, is dealt with in Chapter 4. The open approach of the re-interrogation of relevant literature and the two unstructured interviews with executive experts in the field has resulted in a tentative definitional conception of a Logistics City-Cluster, which allowed the creation of a preliminary framework, consisting of two categories. This was used to develop the subsequent collection phase of Round II.

Outcomes of Round II are presented in Chapters 5, 6, 7 and 8. The preliminary framework and its elements have been assessed by carrying out semi-structured face-to-face interviews, which then have been analysed by qualitative coding methods, resulting in a significantly elaborated framework. Chapter 5 provides the extended definitional conception of a Logistics City-Cluster and introduces the elaborated framework, which now consists of three core categories. Chapter 6 expands on the central enabling category and describes its eight subcategories and their respective properties. Chapter 7 discusses the newly introduced main category of influence on the central enabling categories and Chapter 8 describes the third main category that is related to the impacts on the three pillars of sustainability that the core activities have within the region.

The validations of emergent themes, which were carried out in Round III, are presented in Chapter 9. This final round tested the elaborated Logistics City-Cluster by applying a structured questionnaire. The validated outcomes of the model are presented within this chapter in the form of text description, figures and tables related to an 'approve or disapprove' voting dimension. Further, it explicitly discusses the consensuses and differences for all categories and sub-categories that are explored during the validation process.

Chapter 10 completes the study with conclusions related to the research questions and the implications for each of the categories drawn from the validated model. This is followed by the knowledge claims of the research with especial focus on the significance and practical application of the results. The chapter ends with a section that explicitly discusses the limitations of the study and outlines future research opportunities.

# Chapter 2

## Literature Review: Logistics City-Clusters

### 2.1 Introduction

The first section of this chapter presents an in-depth review of logistics nodes by focusing on six designations: (i) 'Freight Villages' (ii) 'Inland Ports' (iii) 'Freight Hubs', (iv) 'Intermodal Terminals' (v) 'Logistics Cities' and (vi) 'Logistics Clusters'. This review has guided a literature investigation into the evolution of logistics node progressions, describing the dominant determinants leading to sophisticated logistics poles. It concludes with a developed logistics node hierarchy that is based on distinguishing levels of value-add activities, differences in their geographical size, number of bounded logistics nuclei and urban constructs, leading to a first definitional understanding of the Logistics City-Cluster.

The second part of this review critically discusses and explains the focal points of relevant theoretical cluster frameworks related to the concept of Logistics City-Clusters. Identified competing and overlapping theories are summarized in a collective listing of twelve determinants representing the underlying processes of clusters. These are seen as a platform that, combined with the first part of the literature review, provides a sophisticated foundation upon which to theorise and create a preliminary model of Logistics City-Clusters.

In the third section, there is a review of the sustainability notion, because it is argued that logistics agglomeration in a metropolitan area facilitates sustainable growth for a region. The focus here is on the 'Triple Bottom Line Approach' with its (i) economic, (ii) environmental and (iii) social dimensions. A critical discussion on the current challenges of this theoretical framework and the identification of the 'core capitals', which are the foundation for the further development of the preliminary Logistics City-Cluster framework, concludes this section.

Finally, the chapter reflects on the knowledge gap regarding the composition of Logistics City-Clusters and their actual effects on the region. Consequently, the aims and objectives of investigation are introduced.

## **2.2 Review of logistics node progressions**

ILSCM focuses its research on the concept of 'Logistics Cities' particularly with regard to the metropolitan area of Melbourne. ILSCM (2007a) defines a 'Logistics City' as the final progression of a 'Dense Trade Cluster' (DTC), embracing multi-modal infrastructure, an international gateway (e.g. a large seaport or freight airport) and embedded in a metropolis of at least 3 million inhabitants. Additionally, ILSCM (2007b) provides a definition for DTCs, describing it as a nodal point that facilitates and processes international trade by strategic investment in multimodal transportation assets and by promoting value added services. Moffatt-Nicholson Engineers (2002) further describe DTCs as areas which process trade and have convenient rail access. It is argued that such areas are concentrated within an 80 mile radius that incorporates concentrated logistics demand. Cambridge Systematics (2004), instead, argue that DTCs have a radius of 45 – 75 km and links mainly to efficient non-truck port-related traffic. Generally, all three different definitional understandings coincide, with the latter two broadening the definition by including a geographical range.

More importantly, the work of ILSCM (2007a) proposes four levels of a DTC, namely: 'Freight Villages', 'Inland Ports', 'Freight Hubs' and 'Logistics Cities'. It is argued that these progress in order of size and range of services provided. The concept of a 'Logistics City' is seen as the largest manifestation of a DTC, implying that the other three designations are contributing integral parts. These designations and their variants are reviewed and discussed in the next paragraphs in terms of their definitions and characteristics.

### **2.2.1 'Freight Villages'**

Breitzmann and Wenske (2003) and Konings (1994) assert that a 'Freight Village'<sup>1</sup> is an element of intermodal transport chains which provides efficient transshipment infrastructure supported by specialized logistics services. UNECE (2001) further specified that it is a geographical grouping that comprises at least one terminal and offers accompanying services such as storage, maintenance and repair. Capineri and Leinbach (2006) and Tsamboulas (2005) suggest that this bounded grouping of infrastructure and superstructure is linked to different transport modes, logistics

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<sup>1</sup> The phenomenon of a 'Freight Villages' has no unanimously agreed name (Rimiene & Grundey, 2007; EEIG, 2004). Whilst in Great Britain, Spain and Greece the name 'Freight Villages' is common, in Denmark they are called 'Transport Centres', in Italy 'Interporto' and in Japan, USA and China they are known as 'Logistics Centres' (Meidute, 2005; UNECE, 2001).

services and is equipped with sophisticated information technology. The ‘European Association of Freight Villages’ broadly describes the concept as a site concentrating logistics activities such as transport, goods distribution and warehousing (EEIG, 2004). Interestingly, Capineri and Leinbach (2006) argue that ‘Freight Villages’ are located inland to unload and repack containers from major seaports, but this specification is not supported by other publications.

Activities within a ‘Freight Village’ are carried out by more than one company for national and international trade purposes and it consists of essential facilities and services to support the logistics sector (Meidute, 2005; EEIG, 2004). This notion of a shared system is also strengthened by Tsamboulas and Kapros (2003) by stating that the concept as a logistics platform has various internal stakeholders such as multiple logistics service providers, logistics users or business services. In summary, ‘Freight Villages’ can be described from the perspectives of (i) infrastructure and facilities and (ii) related logistics and business services, as shown in Table 2.2-1.

**Table 2.2-1: Infrastructure and service elements of ‘Freight Villages’**

Infrastructure and Facilities	Logistics Services	Additional Services
<ul style="list-style-type: none"> <li>▪ intermodal terminals</li> <li>▪ multi-modal infrastructure</li> <li>▪ container depots</li> <li>▪ warehouses / distribution centres</li> <li>▪ multi purpose business centres</li> <li>▪ post offices</li> <li>▪ petrol stations / washing facilities</li> <li>▪ hotels, restaurants and cafes</li> </ul>	<ul style="list-style-type: none"> <li>▪ multi modal transport operations</li> <li>▪ transshipment / loading / unloading</li> <li>▪ cargo consolidation</li> <li>▪ stuffing / stripping of containers</li> <li>▪ information services</li> <li>▪ simple warehouse services</li> <li>▪ value-add services</li> <li>▪ customs services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Financial &amp; insurance services</li> <li>▪ legal services</li> <li>▪ retail and wholesale activities</li> <li>▪ other commercial service</li> <li>▪ transit services (public transport)</li> <li>▪ postal services</li> <li>▪ hospitality / accommodation services</li> <li>▪ refuelling and washing services</li> </ul>

Labanauskas and Palsaitis (2007) and De Souza et al. (2007) argue that locating logistics activities and infrastructure in a dedicated zone improves the competitiveness and efficiency of individual companies. This is due to their combined efforts and shared risk, plus the economy of scale and de-bureaucratization, which cannot be achieved by single small and medium sized companies (Meidute, 2005). However, the positive effect of enhancing the competitive advantage of single firms into a system does not automatically emerge (De Souza et al., 2007). Tsamboulas and Kapros (2003) argue that the public domain’s provision of infrastructure is necessary to allow advantageous grouping of related activities. Another critical factor for generating positive effects is the geo-strategic concern of a favourable location in regards to its proximity to sufficient market demand, which includes efficient access to these freight generators through transport networks (Nathanail, 2007; Capineri & Leinbach, 2006).

Tsamboulas and Kapros (2003) and Meidute (2007) also assert that the development of 'Freight Villages' not only benefits private stakeholders, but also the region and its associated governments and population. It is generally argued that the public domain's interest is in the resulting socio-economic benefits for the region such as employment possibilities and economic growth (e.g. Capineri & Leinbach, 2006; Tsamboulas, 2005; Meidute, 2005). In this context it is claimed that 'Freight Villages', due to enhanced transport infrastructure, logistics services and integrated information technologies, enable a stronger integration in global supply chains and therefore enhance the regional economy (Meidute, 2005; Tsamboulas & Kapros, 2003).

It is commonly claimed that 'Freight Villages' are a progression of a simple terminal due to the integration of additional logistics activities and supporting activities (e.g. Labanauskas & Palsaitis, 2007; Capineri & Leinbach, 2006; Meidute, 2005). However an interesting and somewhat surprising point has been made by Ballis (2006), who claims that 'Freight Villages' also operate in the United States as 'Inland Ports'. ILSCM (2007a), on the other hand, distinguish between these two and it is this contestation that necessitates the further in-depth investigation of the 'Inland Port' concept.

### **2.2.2 'Inland Ports'**

Generally, 'Inland Ports' are defined as logistics sites that include appropriate multimodal transportation assets, logistics services and business value-add activities having the ability to enable international trade (e.g. Notteboom & Rodrigue, 2009; Cumming & Elzer, 2007; Walter & Poist, 2004). Chang and Canode (2003) extended this definition by stating that 'Inland Ports' include FTZ, have access to sufficient labour, and tend to involve high value commodities.

Despite this general consensus, there are different understandings of possible classifications. In this context Leitner and Harrison (2001) identified four different types of 'Inland Ports', which are: (i) 'Inland Waterway Port', (ii) 'Air Cargo Port', (iii) 'Maritime Feeder Inland Port' and (iv) 'Trade and Transportation Centre Inland Port'. However, according to the IBI Group (2006), 'Inland Ports' can be classified more conveniently by three specific notions: (i) the modal orientation (e.g. inland waterway and rail); (ii) the distance to global gateways (e.g. short and long distance) and (iii) the notion of principal traffic (e.g. export-import traffic). This understanding is similar to Notteboom and Rodrigue (2009), who argue that an 'Inland Port' incorporates massification of flow networks by rail and barge terminals that are linked to other major gateways. Both

Notteboom and Rodrigue (2009) and the IBI Group (2006) argue that an 'Inland Port' performs several functions of a seaport whilst located inland, in contradiction to Leitner and Harrison's (2001) definition.

Interestingly, some scholars oppose the argument that an 'Inland Port' is located on navigable water and refer to it as an inland dry-port (Cumming & Elzer, 2007; Walter & Poist, 2003). Whilst Roso et al. (2009) and Jaržemskis and Vasiliauskas (2007) support the notion of a dry-port, they apply the classification measure of distance from a maritime gateway and argue that the 'Inland Port' function is a supporting node for seaports, reducing their congestion and securing hinterland market opportunities. In this regard 'Inland Ports' have been also referred as 'Agile Ports', which guarantee efficient distribution and environmental benefits by setting up a direct mass transportation seaport link (Bryan et al. 2007; Roso, 2007).

Based on their world-wide review, Harrison et al. (2004) state that it is difficult to classify the wide variety of 'Inland Ports'. Therefore, the appraisal of Bichou and Gray (2005) that, depending on geographical circumstances, an 'Inland Port' does not necessarily require navigable water or a link to maritime transport node is the most neutral description of the location factor.

Notwithstanding, these different interpretations, there are generic characteristics and services of an 'Inland Port' identified in the literature. Activities commonly include transshipment and distribution services, customs brokerages and clearance, integrated information systems, stuffing and stripping of containers as well as their consolidation and buffering (e.g. Roso et al., 2009; Notteboom & Rodrigue, 2009; Walter & Poist, 2003; Leitner & Harrison, 2001). The most sophisticated understanding of services provided by 'Inland Ports' is proposed by Walter and Poist (2004), based on field interviews and focus group discussions. The generic and widely agreed services and characteristics are shown in Table 2.2-2.

It was found that 'Inland Ports', like 'Freight Villages', can increase efficiencies for its commercial stakeholders and have the capability to create local employment and regional economic growth (e.g. Roso et al., 2009; Doms & Macharis 2003, Prozzi et al., 2002). However, Notteboom and Rodrigue (2009) warn that there is the potential of over-investment because many locations want to participate in this growing segment. It is stated that the decision to create an 'Inland Port' must be based on the demand of cargo flows and the efficient access to these freight generators (Notteboom &

Rodrigue, 2009; Roso et al., 2009; Walter & Poist, 2003). Hence, 'Inland Ports' must take the geo-strategic notion into consideration.

**Table 2.2-2: Elements of 'Inland Ports'**

<b>Services and Characteristics of Inland Ports</b>
<ul style="list-style-type: none"> <li>▪ transportation centre (e.g. compliance activities)</li> <li>▪ multi purpose business centre (e.g. trade show facilities, office space)</li> <li>▪ port of entry for customs and inspections</li> <li>▪ general and bonded warehouse services</li> <li>▪ intermodal transshipment facilities</li> <li>▪ foreign trade zones (e.g. tariff shelter, light assembly and distribution)</li> <li>▪ travel plaza (e.g. food service and rest areas)</li> <li>▪ single source for federal and state transportation / trade agencies</li> <li>▪ information clearinghouse or library for transportation and trade publications</li> <li>▪ internet web sites providing transportation and trade information</li> </ul>

An important claim of Cumming and Elzer (2007) is that an 'Inland Port' is different to a 'Freight Village', which agrees with the understanding of ILSCM (2007a). However, their argument that 'Inland Ports' provide additional services such as customs inspections, bonded warehouses and banking can be criticized, since these are also an integral part of 'Freight Villages'. Hence, based on the literature review, the differentiation of both concepts continues to be contested and their difference appears to be in the area of nomenclature since their characteristics and purposes are comparable.

### **2.2.3 'Freight Hubs'**

'Freight Hubs' are frequently defined as nodes that enable the transfer of freight between different transport modes, and in this context the term gateway is often used as a synonym (Van Dam et al., 2007). The core function of a hub is large-scale freight consolidation in terminals, which is characterized by short, medium and long distance distribution on regional and international levels (Racunica & Wynter, 2005; Hesse & Rodrigue, 2004). It is argued that 'Freight Hubs' are planned and operated on the basis of a particular freight network design, referred to as a 'Hub-and-Spoke' arrangement (Racunica & Wynter, 2005; O'Kelly, 1998) and therefore efficiency requirements are dependent upon transshipments and transport linkages to other destinations (Hong & Chin, 2007). Indeed, to participate in trade growth and to generate economies of scale, 'Freight Hubs' focus on infrastructure development that enhances transshipment and transport capacity. Due to this focus and the current spatial constraints, there is limited

attempt to integrate additional logistics and business service in 'Freight Hubs' (Hesse & Rodrigue, 2004; Lemoine & Dagnaes, 2003).

Numerous studies conclude that the existence of 'Freight Hubs' is only possible if sufficient demand is available (van Dam et al., 2007; Hong & Chin, 2007; Racunica & Wynter, 2005). This is embedded in the fact that economy of scale is needed to justify the massive infrastructure development and the efficient operation of associated mass transport modes. It also appeared that its development depends on factors such as the financial stability to provide the necessary infrastructure and the government sector (Van Dam et al., 2007). Hence, the earlier arguments for 'Freight Villages' and 'Inland Ports' regarding geo-strategic concerns and government reinforcement also apply here.

Like 'Inland Ports' and 'Freight Villages', hubs involve various stakeholders such as transport agencies, infrastructure providers, hub operators and users, governments and communities (e.g. van Dam et al., 2007; Nathanail, 2007; Hesse & Rodrigue, 2004). Most stakeholder-related studies focus on the benefits for hub operators and users by pinpointing increases in efficiencies, cost reductions and higher frequency of transport schedules due to critical cargo mass (Racunica & Wynter, 2005; Hesse & Rodrigue, 2004). However, there are also recognized benefits for the community such as the minimizing of environmental externalities and the creating employment opportunities (van Dam et al., 2007).

There is one significant difference between 'Freight Hubs' and 'Freight Villages' / 'Inland Ports'. Hubs only considers consolidation, transshipment and distribution as the core objective, although it can eventually evolve to an integrated logistics centre having the value-add services of 'Freight Villages' and 'Inland Ports'. In this context it was argued that complex supply chains integrated in 'Hub-and-Spoke' systems can further attract pure logistics providers and various other business value-add activities (Lau & Tsang, 2008; Lemoine & Dagnaes, 2003).

#### **2.2.4 'Intermodal Terminals'**

In the earlier discussion, 'Intermodal Terminals' were seen as the principal component of 'Freight Villages', 'Inland Ports' and 'Freight Hubs'. There is a strong consensus on the definitional understanding of a terminal as the point of transfer of freight from one transport mode to another which requires a large amount of land and a high degree of

accessibility (e.g. Labanauskas & Palsaitis, 2007; Racunica & Wynter, 2005; UNECE, 2001). In this context, Tsamboulas and Dimitropoulos (1999) classified intermodal terminals on the basis of possible transport modes, noting that each results in its own classification by size. Sirikijpanichkul and Ferreira (2005) identified the same classification criteria, but also extended it by an organisation category (e.g. single customer terminals or independent service providers).

However, Meyrick (2006) proposes two types of 'Intermodal Terminals': (i) pure terminals that provide transshipment services and (ii) value-add terminals which constitute features of 'Freight Villages' and 'Inland Ports' by providing ancillary services. In contrast, Aifandopoulou et al. (2005) classify intermodal terminals into four different types which are: (i) 'City Terminals', (ii) 'Freight Villages', (iii) 'Logistic Parks' and (iv) 'Special Logistics Areas'. Hence, it is implied that 'Freight Villages' are a class of terminals, rather than terminals being a basic element of 'Freight Villages'.

'Intermodal Terminals' are also associated with a range of stakeholders and can bring benefits to its users and operators due to economy of scale (Meyrick, 2006; McCalla et al., 2001). In addition, observations on the regional effects of intermodal terminals, such as regional employment and economic development, are consistent with arguments made for the other logistics nodes (Meidute, 2007; Doods & Macharis, 2003).

Despite a few contested naming conventions and controversial classifications, it can be concluded that there is general consensus on the nature of an intermodal terminal and its core services of simple transshipment between transport modes. Further, an important supposition is that 'Freight Villages', 'Inland Ports' and 'Freight Hubs' are more than just a terminal, since these are progressions of a simple 'Intermodal Terminal' by providing additional functions and services.

### **2.2.5 'Logistics Cities'**

ILSCM (2007a) defined the 'Logistics City' as a metropolitan area with a dominant agglomeration of logistics and supporting value-add services that embrace transport infrastructure and gateways. This study further identified three main key enablers for 'Logistics Cities':

- 'Consolidation of the Geographic Dispersion': This enabler highlights logistics nodes as focal points for innovative and effective services connecting industry and retail.

- 'Enhancement of Business Services': Value-add business services, apart from logistics operations, are key component in the development of 'Logistics Cities'.
- 'Increased Transport Infrastructure Capacity': This enabler deals with the augment of capacity and connectivity through the application of intelligent transport technology.

In their later publications, this understanding is extend by including the notion of social infrastructure and the coordination of the various stakeholders of a 'Logistics City' as essential elements (Nagel et al., 2009a). Apart from the work of ILSCM, public information is largely restricted to specific web-based material that is associated with metropolitan 'Logistics Cities', which are either being planned, under development or in an expansion phase.

In this context two smaller inland developments, which are labelled as 'Logistics Cities' are identified. First, Schulz (2001a) mentions *Colombia (Mexico)* as an up-coming 'Logistics City' connecting Mexico to the United States, which currently deals with 40% of the total transport of goods between the two countries (Schulz, 2001a). This development provides not only an adjacent FTZ and airport, but also enables efficient border crossing by a 12-lane bridge and two major railroads, supported by expeditious legal and administrative computerized customs procedures. The next development announced is an additional 2.4 km<sup>2</sup> international trade facility combining warehouses, custom brokers and shipping companies and additional business services such as hotels and banks (Schulz, 2001b). The second is *Zaragoza (Spain)* as part of the development plan of the Aragon region to diversify its economic structure (Tierney, 2004). Zaragoza has a major aviation hub and efficient transport infrastructure that integrates high speed rail links, and further is seen as a distribution hub for the seaports of Bilbao, Barcelona and Valencia. The core asset of this 'Logistics City' is its 11 km<sup>2</sup> 'Freight Village' (Plaza Logistica), which has already attracted more than 100 global and regional companies (MIT, 2009). Beside the typical logistics assets such as multimodal terminals and warehousing, Plaza Logistica includes the typical value-add business services and amenities of 'Freight Villages' and a dedicated technology precinct (Plaza, 2010). To meet the objective of becoming a global logistics centre, the government also invested into logistics research and higher education facilities, such as the newly opened subsidiary of the Massachusetts Institute of Technology (MIT) in Zaragoza (MIT, 2009). This strategy of diversifying the economic setup of the regions by introducing the logistics sector appears to be successful. The region's economy grew with a yearly average of 3.3% since the first major logistics developments, which is above the Spanish average, and also during the economic recession, the region's economy grew by 1.5% (MIT, 2009).

There are also three massive ‘Logistics Cities’ observed that have a parallel structure, since their development is based on interrelated zones which have specific functions. These are the ‘Logistics City’ of Lingang, Dubai and Manila and their zoning approach is summarised in Table 2.2-3.

**Table 2.2-3: Logistics Cities Zones – Lingang, Dubai and Manila**

Logistics City of Lingang	Dubai World Central	Global Gateway Logistics City
<ul style="list-style-type: none"> <li>□ <b>Central Industrial Zone:</b> (200 km<sup>2</sup>) manufacturing</li> <li>□ <b>Heavy Equipment Zone:</b> (33 km<sup>2</sup>) including a heavy equipment port</li> <li>□ <b>Hi-Tech Park:</b> (30 km<sup>2</sup>) research facilities and universities</li> <li>□ <b>Harbour New City:</b> (98 km<sup>2</sup>) residential, leisure and finance district</li> <li>□ <b>Logistics Park:</b> (21.5 km<sup>2</sup>) terminals, warehouses and a FTZ</li> </ul>	<ul style="list-style-type: none"> <li>□ <b>Real Estate</b> <ul style="list-style-type: none"> <li>▪ <i>Commercial City:</i> business and financial area</li> <li>▪ <i>Golf City:</i> golf courses, restaurant, boutiques</li> <li>▪ <i>Staff Village:</i> housing, amenities</li> </ul> </li> <li>□ <b>Global Technologies:</b> providing communications services and information platforms</li> <li>□ <b>DuServe:</b> infrastructure and facilities management (e.g. planning, maintenance)</li> <li>□ <b>Al Maktoum International Airport:</b> six runways with a length of 4.5 km</li> <li>□ <b>Free-Zone</b> <ul style="list-style-type: none"> <li>▪ <i>Logistics City:</i> e.g. value added services, FTZ, amenities and IT</li> <li>▪ <i>Aviation City:</i> e.g. aviation maintenance, repair, overhaul centre</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>□ <b>Logistics Park:</b> (76 ha) multimodal hub, warehousing and light manufacturing</li> <li>□ <b>Business Park:</b> (51 ha) general business activities, aviation support activities</li> <li>□ <b>Aero Park:</b> (26 ha) aviation training, IT activities, research &amp; development</li> <li>□ <b>Town Centre:</b> (10 ha) commercial and residential centre</li> </ul>

The ‘Logistics City’ of Lingang is a massive five zone development on the peninsula south east of Shanghai (Leach, 2006). The logistics park, one of the five zones, includes an inland river port, a railway terminal and many logistics businesses (Leach, 2006). The infrastructure assets within a radius of 70 km include three airports, two major railway nodes and three seaports, which are efficiently integrated by a transport infrastructure network. This ‘Logistics City’ aims to integrate global supply chains for northeast Asia, which should result in a stronger industry structure, enhance technological innovation and therefore strengthen the economic development and employment situation in the region (Lingang Group, 2006).

The most widely known ‘Logistics City’ is part of *Dubai World Central (DWC)*, a five zone development with a total area of approximately 140 km<sup>2</sup> (DWC, 2010; Proffitt, 2006). The new DWC mega-project was necessary due to constraints in current cargo handling capacities and the growing demand for value-add services (Walter & Eiermann, 2008). Dubai ‘Logistics City’ (DLC) is located adjacent to the new air cargo terminals of the Al Maktoum International Airport and to Jebel-Ali-Port. Importantly, all three components are integrated in a single customs-bonded free zone and are efficiently linked with rail and road corridors (Proffitt, 2006). DLC is dedicated to cargo consolidation, warehousing, distribution services, light manufacturing and assembly, and includes a business park for administration and logistics ancillary services (DWC,

2010; MEED, 2006). The holistic development of DWC is aimed at providing a maritime and aviation integrated logistics platform with excellent logistics know-how and quality labour (Walter & Eiermann, 2008), which is seen as a strategy to enable economic growth (Turner, 2006).

The current development of '*Global Gateway Logistics City*' (GGLC), located north of Manila (Philippines), is promoted as the crossroads of Southeast Asia. (GGLC, 2010). GGLC, adjacent to the international Diosdado Macapagal Airport, aims to be an aviation-oriented logistics and business centre (SCA, 2008). It is also connected to the railway, two express highways and the deep-sea container port at Subic Bay. The development will provide tax, customs and duty incentives to increase its attractiveness for logistics operators and also offers various amenities and green space, as indicated by the zones. It is expected that this development will create up to 72,000 jobs and will significantly boost the regional economy (Daza, 2009).

A final massive 'Logistics City' that was identified is Shenzhen (HKTDC, 2004; Jun, 2004). The decision to give the logistics sector high priority took place two decades ago and was based on the great potential regarding to Shenzhen's strategic geographical position (Shenzhen Government, 2007; Wang, 2004). First, it benefits from the strong manufacturing industry in the "Pearl River Delta" region and south China generating logistics demand. Secondly, it profits from the coastal location and its efficient access to the international markets via the current fourth largest container seaport in the world (Wang, 2004). Shenzhen evolved over the last two decades from a transshipment node to an area that integrates 3PL and 4PL activities, light assembly and logistics ancillary activities (CER, 2007, HKTDC, 2004). This was strengthened by the development of eight large-scale logistics parks, focusing on different aspects such as seaport and airport related activities, import/export and transshipment services as well as intra-city logistics operations (Shenzhen Government, 2007). The logistics sector now plays an important economic role, since its growth rate is above the average and logistics accounts for approximately 20% of the regional GDP (CER, 2007; Shenzhen Government, 2007; HKTDC, 2004).

It is concluded that 'Logistics Cities' focus on different infrastructures and services. For instance, whilst the coastal 'Logistics City' of Shenzhen aligns its infrastructure and services towards the massive seaport, GGLC's core functionalities are based on airport development. In addition there are differences in size, since the 'Logistics City' of Zaragoza appears small in comparison to Dubai or Lingang. Another distinction is the

structured zone planning of recently developed 'Logistics Cities' versus the historical grown approach such as in Shenzhen. Another contrasting element is that DLC is seen as the logistics area of the comprehensive structure of DWC, whilst Lingang or GGLC perceive all zoning elements of DWC as 'Logistics City' elements. However, there are strong commonalities. First, all include at least one major gateway and provide sufficient intermodal and communication infrastructure. Second, all integrate the entire set of logistics and value-add business services. Clearly, these two findings align with the enabling elements identified by ILSCM (2007a). Third, all developments include social amenities and research/education facilities, which strengthens the extension of the enablers proposed by Nagel et al. (2009a). Finally, 'Logistics Cities' are part of the economic development plan of their associated governments to increase the competitiveness of their region.

Indeed, the concept of a 'Logistics City' at this stage appears to be a contested notion, which is supported by ESCAP's (2009) argument that there is no obvious difference between the dry-port concept and a 'Logistics City'. However, of great importance for this study is the general understanding that any large agglomeration of logistics activities, independent of whether they are coastal or inland, can be referred as a logistic cluster (e.g. ESCAP, 2009; Groznik, 2008; Rebnitzer, 2007; Notteboom & Rodrigue, 2005). This fact, in combination with the arguments of ILSCM (2007a) that a 'Logistics City' is the final progression of a DTC, led to a further investigation into the notion of logistics cluster.

### **2.2.6 'Logistics Clusters'**

Clusters are defined as groups of organisations that provide a related group of products or services located in a specific geographic region linked by interdependencies (Porter, 1998). Ketels and Memedovic (2008) further argue that clusters are a manifestation of the specialised knowledge, skills, infrastructure and supporting industries for a particular sector that enhance productivity and enable sustainable growth for a region.

ESCAP (2009) clearly state that the term logistics cluster does not appear widely in academic literature and it seems to be a contested terminology<sup>2</sup>. Despite obvious

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<sup>2</sup> For instance logistics clusters can refer to humanitarian programmes that are associated with an organisation that coordinates the elements of a supply chain regarding humanitarian aid. Although logistics is the key concern of this organisation, it does not refer to a logistics agglomeration, but rather to the coordination of logistics activities.

ambiguities, the general understanding of logistics clusters is based on the generic cluster definition. Hence, logistics clusters are referred to as an area that concentrates interdependent logistics service providers, ancillary services, infrastructure providers, government authorities, research institutions and sectors demanding logistics activities (e.g. Groznik, 2008; Rebnitzer, 2007; Viswanadham & Gaonkar, 2003). In this context it is emphasised that logistics clusters are more than a single value chain or networks of companies, but are a holistic value-add system which can create operational efficiencies and force innovative new logistics solutions (Notteboom & Rodrigue, 2005)

There are various logistics clusters named in the literature. For example Groznik (2008) identified four clusters in Europe, which are Seine-Normandy, Wallonia, Turku and the Unitrans clusters. Further, Belotserkovskiy et al. (2009) labelled the metropolitan area of Hamburg as a significant logistics cluster that hosts more than 7,600 logistics oriented firms. Ashai et al. (2007) argued that the United Arab Emirates (UAE) is a logistics cluster driven by Dubai and major logistics companies such as Dubai World Ports. Instead, Rebnitzer (2007) identified 25 primary logistics clusters and approximately 60 secondary logistics clusters in Europe. He argues that traditional long-established logistics agglomeration is found in the Benelux region and along the Rhine-River. However, in the last decade, new clusters in southern France, eastern Germany and in Spain have evolved and he predicts that key expansion of logistics agglomeration will take place in Central and Eastern Europe.

More importantly, Groznik (2008) and Rebnitzer (2007) argued that logistics clusters are wider areas that are not bounded to a single location, but are combinations of various locations in a regional and inter-regional setting. This argument is supported by Ashai et al. (2007) who state that the logistics cluster in the UEA consists of many gateways and in different regions. This perception of a wider geographical area is consistent with the generic understanding of clusters that can cross national boundaries (Porter, 1990) and that clusters are to some extent arbitrary rather than having clear physical geographical borders (De Langen, 2004).

Regarding the generic setup and characteristics of logistics clusters, Viswanadham and Gaonkar (2003) identified four interdependent sub-elements: (i) 'Facilities Cluster' providing the infrastructure, (ii) 'InfoCom Cluster' (iii) 'Knowledge Cluster' and (iv) 'Vertical Industry Cluster' which includes logistics and supporting activities. Wang et al. (2007) supported the understanding and further defined four core characteristics: logistics clusters are (i) a system with multi-level functions regarding space and

distance; (ii) open networks that gather the needed demand and communicate with outside areas; (iii) agglomerations of logistics and complementing activities; (iv) ensuring economy of scale and innovation. Groznik's (2008) understanding of the Slovenian cluster's core elements clearly supports these earlier findings, when he notes that transport and gateway infrastructure, the existence of efficient logistics operators and research institutions are critical elements that join as a system to enable agglomeration benefits.

Another very insightful publication has identified seven crucial sub-systems for the development of logistics clusters (Ma & Huang, 2008). First is the demand requiring logistics activities to form a cluster and secondly there is the innovation sub-system dealing with the notion of competitive pressure and knowledge spillovers. This is followed by the manpower subsystem needed for the activities and the fourth sub-system of resources sharing reducing overall costs. The fifth element refers to as government support (e.g. infrastructure provision, tax incentives and subsidies), whilst the sixth sub-system deals suitable access to capital. The final aspect is the negative effect scheme, which incorporates factors that can hinder cluster development (e.g. restricting local resources or policies).

Not surprisingly, the literature indicated the same internal and external effects as observed in the other logistics nodes. First, companies that are located in logistics clusters derive benefits through economy of scale and concentration of knowledge (e.g. ESCAP, 2009; Groznik 2008; Ashai et al., 2007) Secondly, it is claimed that logistics cluster create a positive feedback for the regional economy such as massive employment opportunities and growth of GPD (e.g. ESCAP, 2009; Notteboom & Rodrigue, 2005; Viswanadham & Gaonkar, 2003). For instance, Belotserkovskiy et al. (2009) argue that the logistics cluster of Hamburg employs 230.000 people and contributes 12% to the gross regional domestic product.

This investigation has identified many similarities between logistics clusters and 'Logistics Cities'. Their definition and their generic setup are comparable, although this review deals with more generic issues. Further the derived benefits for individual companies and the region is identical. It is in this overlapping understanding that 'Logistics Cities' are seen as clusters and are now referred as **Logistics City-Clusters**. However, one major difference, relating to the boundaries and size, remains. Logistics City-Clusters are considered to be in a metropolitan area, whereas the generic cluster can span a much wider region, often resulting in cross border settings.

### 2.2.7 Evolution of logistics nodes

Logistics nodes have progressed over time, starting with simple transshipment functions and moving towards a complex mix of logistics and supporting business services embedded in an urban development. This understanding is supported by ESCAP (2005) who presented a port model consisting of three categories: (i) the export/import port that satisfies the regional demand for trading goods; (ii) the transshipment port that emerges due to the increased complexity of international trade and (iii) logistics centre ports, which result from the sophisticated requirements of multinational corporations and the necessity of ports to increasing their market share by diversification. Notteboom and Rodrigue (2009) argue similarly when presenting their hierarchy of trade nodes: (i) satellite terminals, (ii) inland ports, (iii) freight distribution clusters and (iv) inland gateways. The progression is associated to the quantity and value-add levels of the associated activities. For example, whilst satellite terminals provide only transshipment functions, inland gateways as the highest progression level incorporates the entire range of logistics value-add activities up to advanced 4PL activities and ancillary services. Rimiene and Grundey (2007) in their analysis of logistics centre evolution have developed a three level hierarchy: (i) warehouse and distribution centre, (ii) transport terminal and 'Freight Village', and (iii) logistics node. Comparable to Notteboom and Rodrigue (2009), the levels progress in sophistication by increasing the scope and amount of their activities.

Despite the different progression hierarchies and terminologies, of interest are the core factors that have pushed this evolution. The deeper understanding of possible forces can facilitate a stronger insight of enabling elements and influencing aspects. In the literature it appears that are four core factors: (i) *trade liberalisation*, (ii) *enhancement of transport technology*, (iii) *ICT and* (iv) *new business architectures* (e.g. Rodrigue, 2008; Rimiene & Grundey, 2007; Ashai et al., 2007; Lemoine & Dagnaes, 2003).

*Trade liberalization*, through the reduction of trade tariffs and barriers (e.g. FTA or FTZ), has resulted in regional shifts of production, assembly and quality control activities, which has consequently increased world trade (Rimiene & Grundey, 2007). Hence, new global-oriented production structures, also called global commodity chains emerged (Coe et al., 2004). In particular ESCAP (2005) and Ashai et al. (2007) argue that in response to the increased import/export and transshipment demand, infrastructure and logistics service providers have enhanced their capacities catalysing the rapid development of strong trade hubs. Ashai et al. (2007), for instance, asserts

that further trade and logistics activities were attracted in Dubai by integrating the FTZ in the Jebel Ali seaport. The increased trade also was a strong impetus for companies to focus on logistics management and systems, such as new distribution strategies or the emergence of supply chain management (Rimiene & Grundey, 2007; Hesse & Rodrigue, 2004; ESCAP, 2002).

The *enhancement of transport technology* has had a major impact. Containerization, for instance, led to large logistics locations as part of the emergent 'Hub and Spoke' network (Capineri & Leinbach, 2006; Airriess, 2001) and has resulted in the growing average size of the transport vehicles (e.g. deep sea shipping vessels or barges) and trade hubs (Rodrigue, 2008; Slack, 2001). Consequently, it made transportation of semi- or finished goods more economical (Rodrigue, 2008). Clearly, the lowering of operating cost due to technological development and economies of scale is passed on to customers and strengthens global sourcing, which can lead towards increased transportation, bigger trade hubs and major changes of business practices.

*ICT* as the integrational factor in this multi-stakeholder industry emerged as a fundamental component for logistics systems. It increased visibility and control of supply chains, which led to more efficient handling (e.g. Groznik, 2008; Rodrigue, 2008; Lemoine & Dagnaes, 2003). In particular e-commerce based administration and services such as customs procedures, transport scheduling, tracking and tracing were enabled (e.g. Rodrigue, 2008; Leinbach & Bowen, 2005). This has consequently resulted in increased efficiency by reducing redundant information, costs and inventory, and has enabled better customer retention leading to faster and more reliable trade (Leinbach & Bowen, 2004). Single companies and trade nodes increased their competitiveness through a holistic integration of ICT. The port of Hamburg, for instance, implemented the DAKOSY system (Srour et al., 2008), but it is argued that the most sophisticated logistics information systems exists in Singapore who provide 'Portnet', 'TradeNet' and 'Cargo Community Network', which is aimed to be integrated into one single information platform to enable seamless information transfer as a cluster (Keceli et al., 2006; ICT-WG, 2002).

Trade liberalisation, transport and information technology changed the way in which firms operate and *new business architectures* have emerged (Lemoine & Dagnaes, 2003; Schmitz & Gentry, 2000). Increased global sourcing, trade complexity and cost pressures have led to the outsourcing and constant evolution of logistics activities

(Rimiene & Grundey, 2007). Whilst, for instance, production is concentrated in few locations, the global market is not homogenous and therefore the adaptation to regional demands is essential. Hence, to address this arrangement, logistics operators now include strategies such as centralized inventory, delayed configuration or light assembly, customising and quality control. Another explicit example of evolving business architectures is introduced by Abrahamsson et al. (2003) when discussing three types of logistics strategies: (i) decentralised logistics design and control, which is associated with close geographical distance to production and final demand; (ii) centralised logistics design and control independent from production and sales reducing the total logistics cost; and (iii) centralised logistics platform in which responsibility is concentrated but the logistics systems are managed and adapted in sequence with production and sales (Abrahamsson et al., 2003). In this respect logistics is now becoming explicitly understood as a value-add activity that reduces costs, increases the value of goods and contributes to competitive advantage (Ashai et al., 2007; Lemoine & Dagnaes, 2003).

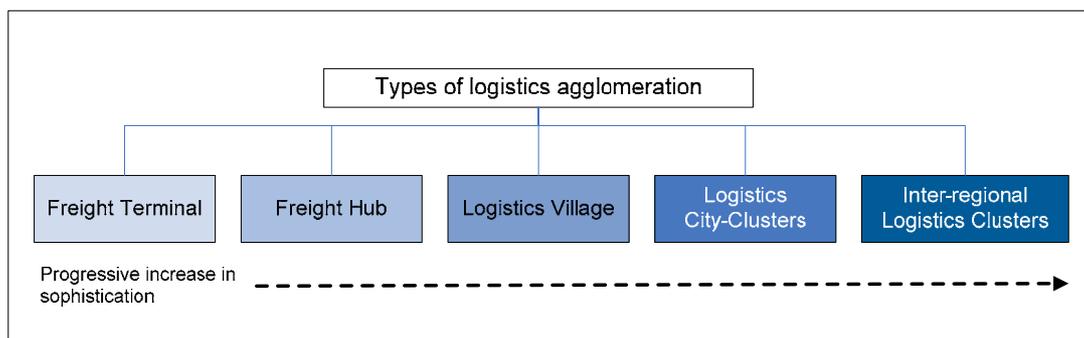
Taking these four core factors into consideration, it was found that large integrated networks and 'Hub and Spoke' systems, combining the advantages of short and long distance transport, was the first step towards integrated logistics platforms (Rodrigue, 2008; Van der Lugt & De Langen, 2005). In association with the hub functionalities, logistics poles, integrating services such as light assembly and other value-add services have emerged (Abrahamsson et al., 2003; ESCAP 2002), which developed during the time of logistics outsourcing (Rimiene & Grundey, 2007; Teo et al., 2001). In this context Notteboom and Rodrigue's (2005) 'four phase model' for the development of large logistics agglomerations is useful to complete the discussion on node evolution. The first phase is the concentration of logistics activities in transshipment centres. In the following phase, dispersed logistics activities are driven into these nodes forming a small logistics pole combined with a further multiplication of smaller logistics nodes in proximate locations. The third phase is emphasised by strong zoning and further logistics polarisation which then, in the final phase, leads to the bundling of logistics zones and poles into one large combined logistics cluster. Singapore is an excellent example of the evolutionary process and currently strengthens its global logistics position as specified in the 'London-Plus Development Framework' (WGL, 2002). The 'Plus' aspect is the physical infrastructure related to port operations, traditional logistics and IT activities. The 'London' aspect refers to the softer area of logistics, aiming to develop a region that is the management platform of global logistics and a centre for excellence in logistics research. It is seen as opportunity for a broader

international hinterland as the nerve centre managing the logistics limbs which reach the entire world.

### 2.2.8 Concluding logistics node progressions

A core conclusion from the review in the field of logistics nodes and their possible progressions is that there are many different definitions and perspectives implying a variety of proposed elements. A widely agreed logistics node classification does not exist and this Chapter has described the range of contradictory and overlapping terminology. For instance Ballis (2006) and Rimiene and Grundey (2007) state that the term 'Inland Port' is a synonym of 'Freight Villages', whereas Cumming and Elzer (2007) and ILSCM (2007a) differentiate between these two concepts. Another example is the controversial subject classification of 'Intermodal Terminals', where the terminal has been mentioned as an element of a 'Freight Village' or 'Inland Port' (e.g. Labanauskas & Palsaitis, 2007; Rimiene & Grundey, 2007), rather than the 'Freight Villages' as a class of 'Intermodal Terminals' (Aifandopoulou et al., 2005).

Despite these disparate views, a tentative progression hierarchy is concluded, starting from simple "Freight Terminals", followed by "Freight Hubs" and "Logistics Villages" to "Logistics City-Clusters" and "Inter-regional Logistics Clusters" (Figure 2.2-1). The distinguishing aspects that allow this progressive classification are related to the increased sophistication of infrastructure, logistics and business services, social amenities and geographical size (Sengpiehl et al., 2009; Wu et al., 2009).



**Figure 2.2-1: Progressions of logistics nodes**

Simple activities such as transshipment, transport and storage operations (*Freight Terminal*) increase with freight consolidation and distribution functions (*Freight Hub*). The *'Logistics Villages'*, which integrate both 'Freight Villages' and 'Inland Ports', have further logistics activities such as light assembly, customizing and supply chain management activities. They also include supporting value-add business services that create potential advantages for the logistics industry. One of the core transition factors

between these three progression and the ‘Logistics City-Cluster’ and ‘Inter-regional Logistics Cluster’ are the physical boundaries. Whilst the first three progressions have clear physical boundaries, the Logistics City-Cluster and ‘Inter-regional Logistics Cluster’ are more diffuse, having planning boundaries which include multiple geographically-bounded logistics nuclei. Both are embedded in urban constructs and, additionally, the size and quantity of their logistics infrastructure is superior, resulting in massive networks. The distinguishing factor between these two is their geographical size and the number of logistics nuclei and urban constructs. Whereas ‘Logistics City-Clusters’ are associated with one particular metropolitan area, ‘Inter-regional Logistics Cluster’ can include various metropolitan areas and can also cross national borders.

Indeed, there is no academically justified conceptual model, which adequately identifies distinct physical characteristics and strategic representation of the Logistics City-Cluster. However, Bontekoning et al. (2004) in their study of intermodal freight literature argued that for research in the pre-paradigmatic phase, it is typical to lack a consensus definition and a common conceptual model. While this is true for the wider Logistics City-Cluster concept and its proposed determinants and designations, this review has constituted a first insight. A Logistics City-Cluster is a geographical concentration of multiple geographically bounded logistics nuclei, one of which one is a massive international ‘Freight Hub’, that are associated with a critical amount of logistics infrastructure. It is embedded in metropolitan constructs such as specific logistics-oriented education or research facilities and social amenities (Figure 2.2-2).

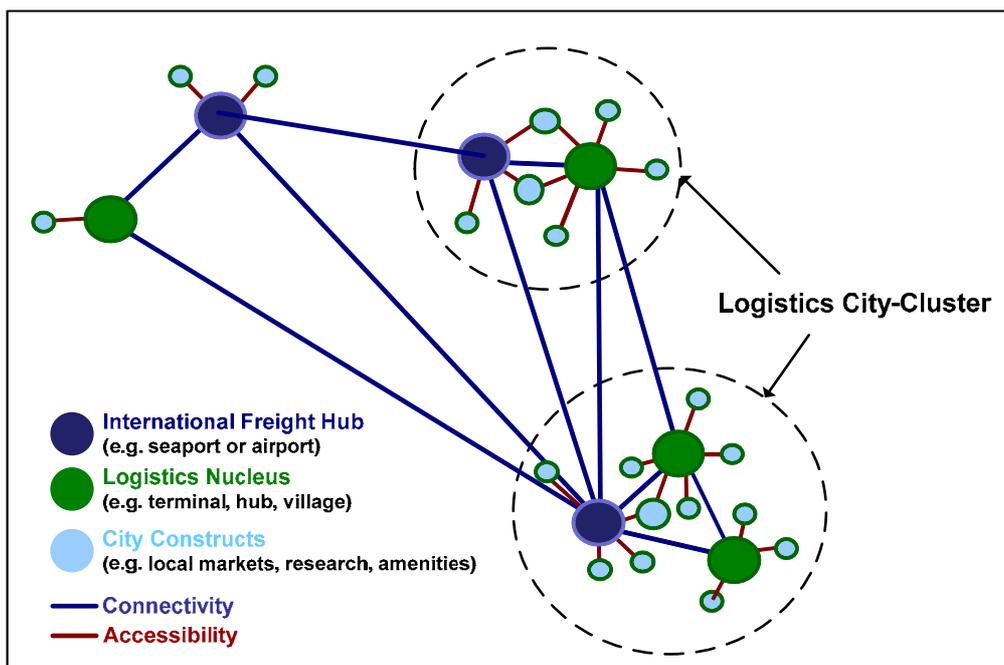


Figure 2.2-2: First insight of Logistics City-Clusters

The literature has identified that Logistics City-Clusters are multi-faceted in terms of their characteristics and have shown that they differ in some aspects, such as size and focus of services. Certainly, differences are recognized for any cluster concept especially in regards to size, geographic span, core activities and sub-clusters networks (McEvily & Zaheer, 1999). However, Logistics City-Clusters have various commonalities. The examples discussed earlier show leverage of excellent international connectivity, superior logistics efficiency and associated business value-added services.

A number of metropolitan areas around the world have established logistics-intensive components in their regional economy on an international competitive level at a Logistics City-Cluster status. These can be found in coastal locations associated with seaports such as Hamburg (Harbour-City), Singapore (Logistics-Cluster), Rotterdam (Port-City) or Lingang (Logistics-City). Nevertheless, Logistics City-Clusters are also found in less obvious inland locations such as in Zaragoza or Duisburg (Sengpiehl et al., 2008a). Whilst most locations are not specifically named Logistics City-Clusters; the concluded underpinning concept is most convenient for this investigation. Hence, whilst the name appears to be used somewhat freely, the concept seems to be accepted as a viable and unique regional development strategy on international level.

### **2.3 Review of cluster theories**

As identified in the first part of this literature review, logistic service providers and ancillary activities tend to concentrate in close geographical proximity. The trend towards clustering seems to be increasing as a result of new technologies, liberal trade and changing business practises. This results in various quantitative location choice models and optimisation tools for logistics operators based on individual cost and services levels. However, Meijboom and Rongen (1995) argue that economic cluster concepts are the crucial component for the agglomeration of logistics, since these frameworks also take macro-strategic qualitative location factors into consideration. Therefore, a review of literature discussing cluster theories is of critical importance to further reveal basic ideas for the phenomenon of Logistics City-Clusters. It allows a deeper understanding and theoretical insight into possible elements of Logistics City-Cluster and factors that can influence its setup. The following paragraphs will discuss and explain the focus of cluster-relevant theoretical frameworks. The core ideas of the theories are summarised and are an integral foundation for the further development of Logistics City-Clusters framework.

### 2.3.1 Relevant cluster theories

The concept of clusters is a major element in the understanding of regional economics, industrial location and generally the structure of urban systems (e.g. Vorley, 2008; Asheim et al. 2006; Parr, 2002b). There are various terms which relate to clusters and their conceptual theories, such as geographic agglomerations, spatial concentrations, growth poles, innovative milieu and industrial districts (e.g. Maskell & Kebir, 2006; Martin & Sunley, 2003). In this regard, Parr (2002b) states that the vagueness surrounding this concept is surprising due to its importance. However, it was found that these various neologisms represent the notion of a specific geographical agglomeration of companies with similar or complementary capabilities, which derive benefits due to proximate co-location. It is widely agreed that while this labelling is linked to Porters' (1990) cluster theory, it has been strongly criticised by various scholars (e.g. Vorley, 2008; Martin & Sunley, 2003; Hartfield, 1998). It is this diversified and critically debated understanding that illustrates, on a generic level, the current complexity and the wide-ranging nature of this concept (Desrochers & Sautet, 2004). It appears that the theoretical foundations assume a variety of meanings and have a significant difference in their approach and it is therefore useful to situate the cluster idea within a wider intellectual context. Various publications, identified as summarising existing cluster theories, are discussed in the next paragraphs.

First, De Langen (2004) has identified four core cluster theories: (i) 'New Economic Geography', (ii) 'Industrial District School', (iii) 'Diamond School' and (iv) 'Population Ecology' (Table 2.3-1). He argues that these concentrate on few variables and particular elements to achieve a partial explanation and notes that most scholars use only one theory and do not mix approaches.

**Table 2.3-1: Analysis of theoretical approaches I**

School of Thought	Leading Authors	Focus
<b>New Economic Geography</b>	Krugman, Fujita, Venables, Rugman	(i) <i>localization economy (labour, supplier specialisation, knowledge)</i> (ii) <i>spatial equilibrium of forces supporting or opposing concentration</i>
<b>Industrial District School</b>	Harrison, Cooke, Stabler, Becattini	(i) <i>explains the characteristics of industrial districts and the success of this organisational mode</i> (ii) <i>based on small / medium size companies and their social and institutional environment</i>
<b>Diamond School</b>	Porter, Rugman	(i) <i>holistic approach to understand the competitiveness of national concentration</i> (ii) <i>foundation is the diamond model</i>
<b>Population Ecology</b>	Metcalfe, Hannan, Freeman, Staber	(i) <i>population dynamics is the core of this theory</i>

By comparison, Meijboom and Rongen (1995), in their study on logistics activities and spatial economics, found three core theories: (i) 'Economic Geography', (ii) 'Organisational Concepts' and (iii) 'Strategic Concepts' (Table 2.3-2). Interestingly, they assert that the theoretical foundations of any economic concentration can be traced back to Alfred Marshall's (1890) studies of industrial districts.

**Table 2.3-2: Analysis of theoretical approaches II**

School of Thought	Leading Authors	Focus
<b>Economic Geography</b>	Krugman, Rauch	(i) territorial and functional environment of companies (ii) localization economy (labour, supplier specialisation, knowledge)
<b>Organisational Concepts</b>	Scott, Harrison	(i) spatial behaviour in regards to the internal and functional environment of a company (ii) distinguished into transaction cost approach and the social economic framework
<b>Strategic Concepts</b>	Porter, Storper	(i) internal, territorial and functional environment of companies (ii) foundation is the diamond model

A third perspective by Cortright (2006) argues for three main cluster theories having various sub-classifications: (i) the 'Neo-Classical Economic Tradition', (ii) the 'Social and Institutional Tradition' and (iii) 'Michael Porter and Business Strategies' (Table 2.3-3). Although he includes the economic development practitioners' tradition as a possible approach, he argues that its theoretical foundation is not cohesive.

**Table 2.3-3: Analysis of theoretical approaches III**

School of Thought	Leading Authors	Focus
<b>Neo Classical Economic Tradition</b>		
<b>Marshall</b>	Marshall	localization economy (labour, supplier specialisation, knowledge)
<b>Regional Science</b>	Isard, Hoover, Giarratani	urbanisation economy (clustering of unlike activities)
<b>Jane Jacobs</b>	Jacobs	scale and diversity of cities drive human capital and ideas
<b>New Economic Geography</b>	Krugman, Fujita, Venables	mathematical modelling of location and urbanisation economics
<b>Urban and Regional Economics</b>	Henderson, Glaeser	apply location and urbanisation to a variety of economic problems
<b>Social and Institutional Tradition</b>		
<b>Business Organisations</b>	Brusco, Piore & Sabel	(i) social forces, individual perspectives, relationships (ii) SMEs embedded in a community and supporting institution
<b>Geography &amp; Urban Regional Planning</b>	Saxenian, Scott, Sassen, Dreier	(i) relationship as a source of clustering (ii) focus on organisation and local culture
<b>Michael Porter and Business Strategies</b>		
<b>Michael Porter and Business Strategies</b>	Porter	(i) neo-classic, business strategy, a bit of social perspectives (ii) foundation is the diamond model

Additionally, Vorley (2008) based on the earlier examination by Asheim et al. (2006) identified five cluster schools: (i) 'New Trade Theory and Marshallian Localisation', (ii) 'Italian Neo-Marshallian Industrial Economics', (iii) 'Neo-Schumpeterian and

Evolutionary Economics’, (iv) ‘Firm Strategy and Marshallian Localisation’ and (v) ‘New Endogenous Growth Theory’. Interestingly, whilst Asheim et al. (2006) and Vorley (2008) do not integrate Porter’s (1990) theoretical framework directly into their classification, they dedicate half their publications to critically analysing his framework and link it to the other theories. In this context (vi) ‘Porter’s Cluster Theory’ is included as a school of thought (Table 2.3-4).

**Table 2.3-4: Analysis of theoretical approaches IV**

School of Thought	Leading Authors	Focus
<b>New Trade Theory and Marshallian Localisation</b>	Krugman, Fujita, Venables	(i) localisation and urbanisation economies (ii) mathematical modelling to identify spatial equilibrium of forces (iii) not much room in the models for socio-institutional factors
<b>Italian Neo-Marshallian Industrial Economics</b>	Becattini, Brusco, Bagnasco, Piore & Sabel	(i) based on localisation economies, introduces culture and community (ii) virtuous networks of rival but cooperating small companies (iii) socio-economic territory = fusion of economy and society
<b>Porter's Cluster Theory Cluster</b>	Porter	(i) neo-classic, business strategy, parts of social perspectives (ii) foundation is the diamond model
<b>Neo-Schumpeterian and Evolutionary Economics</b>	Dopfer, Fagerberg, Høpfer	(i) innovation, learning, entrepreneurship are localized processes (ii) cluster by bringing local traditions and global trends together
<b>Firm Strategy and Marshallian Localisation</b>	Jacob & DeMan	(i) localisation economy and balance between rivalry & co-operation (iii) firm strategy to increase clusters' knowledge intensity
<b>New Endogenous Growth Theory</b>	Romer, Engelstoft, Audretsch & Lehmann	(i) educated labour and R&D as sources of agglomeration (ii) knowledge spillovers due to c R&D and educated labour (iii) no socio-economic notions to explain knowledge spillovers

Clearly, there are various theories that are situated in the wider intellectual context of clusters and, further, these theoretical conceptions are applied in many different ways based on the multiplicity of scholars’ and practitioners’ objectives. However, when analysed more closely, this classification of theories was a first step in overcoming some of the inherent conceptual challenges. Due to the comparison of the epistemological stances, the leading authors and the core focus, it appeared that there are three main cluster theories and various smaller schools of thought (Table 2.3-5).

**Table 2.3-5: Derived classification of cluster theories**

	Meijboom & Rongen (1995)	De Langen (2004)	Cortright (2006)					Asheim et al. (2006) and Vorley (2008)
<b>Neo-Classic Economic Theory</b>	Economic Geography	New Economic Geography	Neo Classical Economic Tradition					New Trade Theory & Marshallian Localisation
			Marshall	Regional Science	Jane Jacobs	New Economic Geography	Urban & Regional Economics	
<b>Social and Institutional Theory</b>	Organisational Concepts	Industrial District School	Social and Institutional Tradition					Italian Neo-Marshallian Industrial Economics
			Business Organisations			Geography & Urban Regional Planning		
<b>Strategic Diamond Theory</b>	Strategic Concepts	Diamond School	Michael Porter and Business Strategies					Cluster Theory: The Porter Brand
<b>Various other smaller theories</b>		Population Ecology						Neo-Schumpeterian & Evolutionary Economics
								Firm Strategy & Marshallian Localisation
								New Endogenous Growth Theory

The *Neo-Classic Economic Theory* has its focus on the behaviour of territorial and functional environments of individual companies. Hence, it commonly examines the agglomeration economies of localisation and urbanisation, including their driving forces such as labour pooling or knowledge spillovers that lead to reduced cost and innovation. Recently, the focus of this school has been on sophisticated mathematical models to examine the spatial equilibrium of forces that support and oppose spatial concentration.

Although the *Social and Institutional Theory* has strong links to the Marshallian localisation economies, it is distinguished by its relation of spatial economic issues to social and cultural aspects. Hence, it sees clusters as a socio-economic territory and accentuates the role of social relations, supportive institutions, cooperative networks and trust as drivers for agglomeration.

The *Strategic Diamond Theory* takes the internal, territorial and functional environments of firms into consideration. The theory is represented by the diamond framework that integrates four strategic determinants. Inherent in this theory is that the more developed and intense the interactions of the four determinants are, the more competitive the associated companies and the cluster become.

It is seen as critical for this study to embody this range of academic theories, since it enables a richer understanding of different factors shaping a cluster. The ambiguity of classifications and applied neologisms is tolerated, because the identification of the factors embedded in the different classifications is of greater importance. In particular, Feser and Luger (2002) argue that researchers should focus on the characteristics of various industry clusters, rather than to make universal hypotheses about clusters. Hence, the three major cluster theories and the collection of four smaller theories will be discussed in the following chapters to allow a rich understanding of critical cluster factors.

### **2.3.1.1 The ‘Neo-Classic Economic School of Thought’**

This school of thought is respected as the oldest theoretical source regarding cluster theories and originates from the work of Marshall (1890). Whilst Marshall did not explicitly apply the term clusters, he introduced the term ‘*agglomeration economies*’. Marshall explained why companies of the same industry sectors concentrate in a particular area and described the benefits companies obtain when they are located in close proximity. He observed that there are three particular forces, subsumed under the heading of ‘*localisation agglomeration economy*’ that enables mutual benefits.

The first force is *labour pooling*, which refers to the accessibility of workforce (Marshall, 1920). He explains the clustering of sectors and its reinforcement as due to large specialised labour markets, which enable lower search cost for qualified workforce and lower severance pay due to high workforce mobility (Paniccia, 1999). A critical mass of companies, also, offers increased employment opportunity, which attracts further skilled workforce and enables training at lower cost. The second force, *supplier specialisation*, is related to cost reduction by shared input factors and reduced transport cost between co-located organisations (Marshall, 1890). Hence, clustering is favoured due to the increasing returns for a product or service. It also facilitates specialization, which enhances the performance of a cluster due to efficient, tailor-made products or services (De Langen, 2004; Krugman, 1995). The third force, *knowledge spillovers*, is associated to the ease of communication between organisations to exchange ideas due to physical proximity (Krugman, 1995; Marshall, 1920). These intra-industry spillovers are also referred to as the Marshall-Arrow-Romer model (Romer, 1986; Arrow, 1962). These three agglomeration forces become self-reinforcing by attracting companies to benefit from cost reduction, skilled labour and innovations. In this regard, the three forces are referred as 'external economies', since these are beyond the control of a single company, but they benefit individual organisation due to the presence of many others (Martin & Sunley, 2003).

Regional scientists have identified another type of 'agglomeration economy' labelled as '*urbanisation agglomeration economy*', which deals with the concentration of unlike companies that share common services, utilities and infrastructure (Isard, 1956; Hoover & Giarratani, 1948). The essence of 'urbanisation agglomeration' differs from 'localisation agglomeration', since it is based on companies from diverse industries, rather than the same sector (Jacobs, 1969). Close proximity and easy access to shared services and infrastructure attract companies that need a diversified environment to achieve economic benefits (Mukkala, 2004; Chatterjee, 2003; Goldstein & Gronberg, 1984). This is particularly important for small or medium sized companies, in which the scale results from the entire urban economy (Lichtenberg, 1960). Notwithstanding these epistemological differences, the three driving forces of labour pooling, sharing intermediate inputs and knowledge spillovers are identical (Capello, 2002; Selting et al. 1994; Glaeser et al., 1992).

In the last two decades, sophisticated mathematical models have been increasingly introduced to investigate the notion of 'agglomeration economies', which is referred to as new economic geography (e.g. Vorley, 2008; Krugman & Venables, 1995; Krugman,

1990). It is argued that once a cluster emerges, its growth and persistence is driven by the benefits of increasing returns (Krugman, 1991). In this context, new economic geography refers to the three classical Marshallian agglomeration forces as '*centripetal forces*' (Fujita et al., 1999; Krugman, 1999). New economic geographers assume a holistic approach by considering both space and time of geographical locations, such as economic and technological changes (Coe et al., 2007; Quah, 2001). Indeed, these changes can also lead to contradictory drivers, named '*centrifugal forces*', which undermine clustering (Fujita & Thisse, 2002; Krugman, 1999). A location, for instance, that has a high concentration of economic activities result in congestions and high real-estate prices, which can force companies to seek another location (Fujita & Mori, 2005; Rauch, 1993). The equilibrium between centripetal and centrifugal forces, the epistemological foundation of new economic geography, is in their core focus (Vorley, 2008; Fujita et al., 1999; Krugman, 1991). This mathematical non-linear equilibrium model leaves little room for the inclusion of soft factors and therefore is partially criticised by social science economists (Martin, 1999; Martin & Sunley, 1996).

Parr (2002a) suggested a third 'agglomeration economy' that focuses on sequential convergent input-output of companies forming a spatial concentrated value chain. It refers to forward and backward linkages in the production to achieve efficiency gains by being in close proximity to the supplier and customer (O'Leary, 2007; Wood & Parr, 2005). This agglomeration economy is called '*activity-complex agglomeration economy*' and is founded on the three classic agglomeration forces (Parr, 2002b). However, the activity-complex economy has not been widely debated and can be easily linked back to localisation and urbanisation agglomeration economies. In this context, Parr (2002a) provides various illustrative examples to disaggregate the three agglomeration economies. First, if for instance all production steps for cloth manufacturing are handled in single companies, the clustering of the textile industry would be regarded as localisation agglomeration. However, if the industry is considered by its constituent parts and sequent processes accomplished in individual companies, the agglomeration would be referred as 'activity-complex economies'. In the third case, when technically disconnecting the activities, the agglomeration would turn into urbanisation economies. The difficulty of separating the three approaches has forced scholars to use the less specific term agglomeration economies or they refer back to the three classic agglomeration forces (Vorley, 2008; De Langen, 2004).

Figure 2.3-1 summarises the core notions of the 'Neo-Classic Economic Theory' that have developed over the last century.

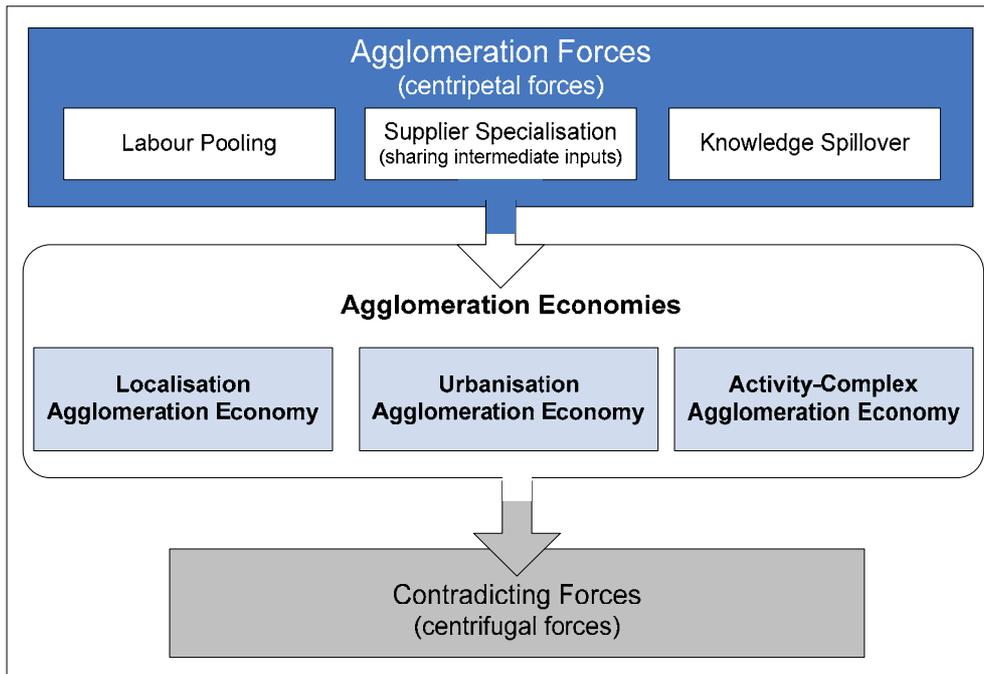


Figure 2.3-1: Notions of the 'Neo-Classic Economic Theory'

### 2.3.1.2 The 'Social and Institutional School of Thought'

Various scholars refer to this theory as the 'Italian School', since its core ideas are derived from industrial districts in Italy (e.g. Vorley, 2008; De Langen, 2004). Whilst the school draws strongly from Marshall's three centripetal forces, its core is the relationship of social and cultural dynamics that favours agglomeration (Paniccia, 2002; Harrison, 1992; Becattini, 1990; Brusco, 1989). Hence, the most notable divergence from the neo-classical conception is that clusters are seen as a socio-economic territory, which is characterised by the spatial presence of both a community and a concentration of companies (Becattini, 2004). Piore and Sabel (1984) also refer to this idea as the 'fusion' of economy and society.

Scott (1986) argues that clusters emerge due to vertically disintegrated companies<sup>3</sup> aiming to reduce costly transactional activities. Hence, activities that have high transactional costs tend to cluster in close proximity which decreases search and recontracting expenditures (Scott, 2004). In this context, not only large firms flourish, but groups of vertical disintegrated 'Small and Medium Enterprises' (SME) with highly specialized market growth through their ability to quickly respond to changes in demand and technology (Scott, 2001; Piore & Sabel, 1984; Brusco, 1990). Hence, this network of small flexible companies embedded in a culture of cooperation and supported by a variety

<sup>3</sup> Companies that are interrelated due to forward and backward linkages (supplier and customer) in the production chain.

of institutions can catalyse clustering and economic growth (Belussi & Gottardi, 2000; Piore & Sabel, 1984; Brusco, 1989).

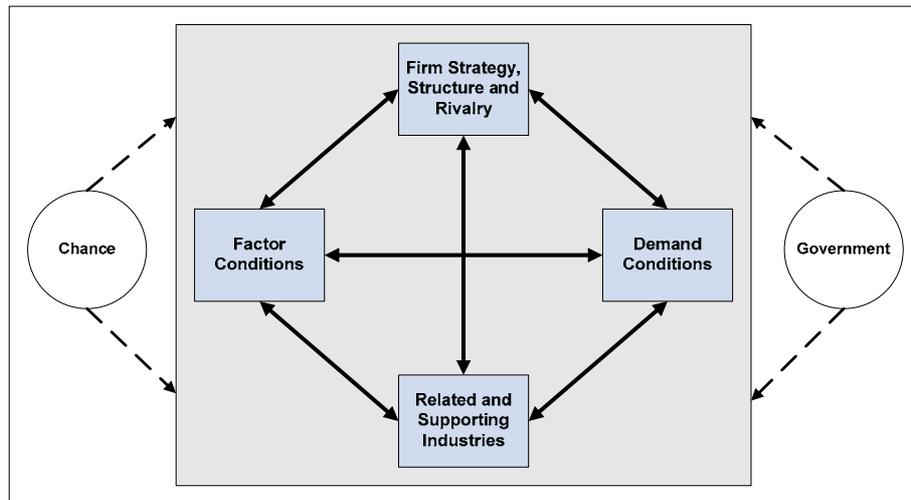
In this regard Becattini (2004) and Harrison (1992) argue that agglomeration of small disintegrated firms is based on social economic theories. Brusco (1990) suggests that concepts of local community and industrial atmosphere are essential to explain economic agglomeration. Whilst analysing specialised industrial clusters of SMEs, it was found that social behaviour factors are a force for agglomeration and regional growth (e.g. Mariotti et al., 2008; Cooke, 2001; Asheim, 2000; Harrison, 1994; Becattini, 1990). Established cooperative networks and trust appear to be essential social behaviour factors, enabling increasing returns due to sharing of equipment, information and skilled workforce. Various scholars have emphasized the nature of social embeddedness as a source of clustering that strongly favours learning and innovation effects through trust, relationships and face-to-face communication (e.g. Shin et al., 2006; Andersson et al., 2004; Cooke et al., 1998; Saxenian, 1994).

Hence this theory is characterised by the active presence of social embeddedness in economic systems and demonstrates that large integrated corporations are not the only way to organise economic scale systems. This school has re-conceptualised Marshall's classic industrial district by strengthening the non-economic socio-territorial dimension, especially for SME. The notion of institutions, social networks and trust are highlighted and provide valuable insights for its role as a mechanism of governance amongst local companies. The conclusion of these scholars is that the force of social capital leads to economic agglomeration and enables concrete regional development. In contrast, Ketels and Memedovic (2008) argue that the "Italian School" has become a symbol of the struggle to keep up with current changes in global value chains and the resulting pressure from other regions. They conclude that global value chains choose the right location and clusters by taking strategic economic issues into consideration.

### **2.3.1.3 The 'Strategic Diamond School of Thought'**

The third major theory considers the strategic concept of firms in relation to their internal, territorial and functional environments (Cortright, 2006; Meijboom & Rongen, 1995). Ketels and Memedovic (2008) describe this as three pillars that a cluster is built upon. First is the pillar of geography that is driven by the notion of proximity. Second is the value creation of companies that are linked by the production chain. The third pillar is the holistic business environment affected by companies, government and other associated organisations. This theoretical understanding is referred as the "Diamond

School”, based on Porters’ (1990) diamond shaped framework, which is built upon four mutual reinforcing determinants (Figure 2.3-2).



**Figure 2.3-2: The strategic ‘Diamond Framework’**

The first determinant represents the *factor conditions* that relate to production factors such as capital, human and knowledge resources, land and infrastructure. Although some of the factors are mobile, they will differ in their regional availability (Porter, 1990). It is claimed that competitive advantage of the factor conditions is not inherited<sup>4</sup> but created over time<sup>5</sup>. In this context Porter (2003) asserts that competitiveness can emerge out of a disadvantage in some basic factors, due to the pressure to innovate, and therefore skilled workforce and knowledge sources are the most important determinants.

*Demand conditions* of a cluster are referred as the second determinant. Porter (1990) strongly focuses on the local demand, which, critics argue, is overemphasised (Dunning, 1993). However, Porter (2000) claims that cluster gain advantage when local demand is sophisticated, since it pressures the particular sector to increase quality and to innovate. Also the size of the local demand is seen as an important determinant, because this allows economy of scale and encourages investment.

The third determinant of *firm strategy, structure and rivalry* is one of his strongest findings. Porter (1990) emphasises that local rivalry is an important determinant of a cluster because of an undeniable pressure to innovate, reduce cost and increase quality. International competition does not result in such strong pressure, since regional differences leave space for excuses when outperformed. He also claims that clusters

<sup>4</sup> Basic factors are inherited such as geographical locations and unskilled labour.

<sup>5</sup> Advanced factors are created over time such as skilled workforce and high-tech infrastructure.

will succeed if the management objectives are favoured by political, social and educational systems. Hence, whilst it seems that social factors are incorporated, Harrison (1994) argues that it is just minor and does not grasp the importance of social theories on spatial agglomeration.

The notion of *related and supporting industries* is the final determinant of the diamond. It denotes the importance for clustering from two perspectives (Porter 1990). First is the presence of vertical support through competitive suppliers, which create advantages in the downstream sectors. Second is the presence of companies focusing on the same product or services to benefit from localisation economies (e.g. shared capacity) and to stimulate local competition (e.g. increased innovation).

Apart from these four determinants, there are also the roles of government and chance. The government can influence all four determinants positively or negatively (e.g. laws or financial incentives). The role of chance is a powerful implication that is outside of the control of companies which can nullify advantages, such as technological discontinuities or major inventions (Porter, 1990).

Porter has partly drawn his model from the 'Neo-Classic Economic Tradition' includes the classic localisation forces of Marshall to understanding economic growth dynamics (Asheim et al., 2006). Indeed, this framework also includes various alternative theorisations. For example Porter (1990) also acknowledges Schumpeter when referring to entrepreneurship and innovation or includes social factors that are emphasised by the 'Social and Institutional Tradition'.

Porter (1998) argues that the more developed and intense the interactions of these four determinants are, the stronger a region becomes. Geographical clustering can be supported by the development of a favourable 'local context' that includes the political environment (Porter, 1990), leading to its popularity as a policy tool. It has, however, been criticised in a twofold way. First a widely discussed weakness is the ambiguity of framing industrial sectors by geographical boundaries, which is a strong source of confusion since Porter has not made clear distinctions between geographical spaces and abstract spaces (Malmberg & Power, 2006; Malmberg, 2003; Martin & Sunley, 2003). Second, the empirical basis of the model is not strong, since it built on perfect fitting cases, rather than empirical studies with defined boundaries (Asheim et al., 2006; Malmberg, 2002; Hartfield, 1998).

#### 2.3.1.4 Various ‘Smaller Schools of Thought’

There were also four smaller schools identified. First, is the theory of ‘*Population Ecology*’ that reflects clusters as a population of similar and complementary companies located in close proximity (De Langen, 2004). The fact that success of specialised or diverse companies has a positive effect on other members of the population indicates similarity with other theories. Its epistemological stance, however, differs since it is argued that the possible diversity of the population enables quick adjustment to changes and provides a wider selection for socioeconomic forces that reduces vulnerability of the cluster (Tisdell, 1996; Metcalfe, 1994). Additionally, it focuses on specific cluster entry and exit barriers, of a cultural, administrative or economical nature (De Langen, 2004; Hannan & Carrol, 1992; Hannan & Freeman, 1989). It is acknowledged that low entry barriers reflect dynamism in the cluster, which allows beneficial competition and easy inflow of capital or knowledge (Hannan & Carrol, 1992). Further, it is asserted that companies strongly attached to a cluster reduce the uncertainty and increases the chance of further investments (De Langen, 2004). Hence, high exit barriers, such as localised skilled workforce or demand, are favourable to reduce these uncertainties (Markusen, 1996).

The second smaller cluster theory is referred as ‘*Neo-Schumpeterian and Evolutionary Economics*’. Despite common themes, this school is distinguished from other theories by its focus on micro-level innovation (e.g. large R&D facilities or entrepreneurship) that is linked to the macro-level of international competitiveness (Hanusch & Pyka, 2007a). Hence, Schumpeter’s (1954) focus on innovation and entrepreneurship is applied at the meso-level of economic systems<sup>6</sup> (Dopfer, 2006; Dopfer et al. 2004; Witt, 2003). Consequently, it is argued that innovation increases regional competitiveness through revitalisation of traditional industry sectors by encouraging technology and process innovation (Vorley, 2008; Hospers, 2005). This theory interprets the notion of path-dependency, innovation and entrepreneurship as being a spatially embedded and localised process (Hanusch & Pyka, 2007b; Metcalfe, 1998). Not surprisingly, much of the literature is directed to successful high-tech clusters driven by innovation and tested by entrepreneurial actions. For instance, Mc Kelvey (2007) attributes the development of a biotechnology-driven cluster to an entrepreneurial culture and technical communities encouraging start-ups. Hanusch and Pyka (2007b) also highlighted the co-relationships between the finance sector and industrial innovations,

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<sup>6</sup> Meso-economics is the study of economic arrangements which links micro and macro economics based on evolutionary concepts.

since technological focused sectors and entrepreneurship require tailored capital to allow neo-Schumpeterian innovation dynamics.

The principle of the third small school, '*New Endogenous Growth Theory*', is that increasing returns and agglomeration arise from investment in human capital and 'Research and Development' (R&D) (Asheim et al., 2006; Romer 1990). The core argument of this theory is that innovation is an important factor of production which is determined by the development and exchange of knowledge and ideas (Audretsch & Lehmann, 2006; Engelstoft et al., 2006; Baptista, 2000). Further, it was argued that geographical proximity is an imperative to capitalize upon knowledge spillovers (Audretsch & Feldman, 2004), and 'swarming' towards innovation is argued as a spatial concentration force (Asheim et al., 2006). Various other scholars, although not directly related with this theory, provide empirical explanation of workforce education and mobility in association with knowledge spillovers and agglomeration dynamics (e.g. Karlsson & Manduchi, 2001; Baptista & Swann, 2000; Castells & Hall, 1994). However, others argue that the basic premise of this theory is not strongly tested, but rather the 'Neo-Classic' agglomeration force of knowledge spillovers and ideas of 'Evolutionary Economics' are investigated (Vorley, 2008; Pack, 1994).

*'Economics of Firm Strategy and Marshallian Localisation Economics'*, the last cluster theory, emphasises local social and institutional environments as well as interfirm networks that enable increasing returns (Asheim et al. 2006). Obviously, while there are overlaps with the other theories, the core differentiator here is the focus on the effect of cooperation and rivalry towards agglomeration (Boix & Capone, 2004). It was observed that firm strategies can support cluster dimensions to enable regional growth. For example, cooperation is favourable in a cluster on the horizontal level such as for education and market development (Jacobs & De Man, 1996). Another element is the introduction of new coordination mechanisms between companies within and external to a cluster, which leads to integrated networks attracting further economic activities (Jacobs & De Man, 1996). It is claimed that collaboration of companies increase the cluster's knowledge intensity and, at the same time, leads to competition on the level of innovation. It is this balance of cooperation and competition that is particularly important (Vorley, 2008; Martin & Sunley, 2003).

### 2.3.2 Concluding cluster theories

Most clusters theories have their roots in Marshall's trinity of agglomeration forces, and over the last decades interest has diverged into various other schools of thought, each having a different core focus. For example in the mid-1980s, several studies on small businesses in Italy revived Marshall's analysis of industrial district dynamics with the focus on social and institutional factors and in 1990 Michael Porter has also rejuvenated interest by his book '*Competitive Advantage of Nations*'. This cluster theory review has demonstrated its inter-disciplinary nature, has highlighted its complexity and shown the ongoing contested debate on its theoretical stance. It was found that clusters vary and can not be explained by a single formal theory. It seems that simply agreeing on one theory is not constructive and therefore it appears that accepting multiple perspectives on clusters is more appropriate (Benneworth & Henry, 2004). Bringing together multiple theoretical approaches that can cross-fertilise each other, allowing a stronger understanding in the multiple elements and dynamic perspectives (Gordon & McCann 2000).

While each theoretical perspective represents an important dimension, a holistic representation of cluster theories' determinants can add richness to this study. It is therefore concluded that the collective listing of common and competing aspects of the discussed cluster theories offers a better platform to provide the basis from which to theorise. In this context, twelve different determinants (Table 2.3-6) have been identified, which represent the underlying processes of the establishment and the growth of clusters. At this stage it is presumptuous to decide which determinants are essential components for a Logistics City-Cluster and on the basis of the diverse determinants a detailed comparison to existing logistics literature is conducted and re-presented in Chapter 4. This analysis, based on the identified theoretical determinants, is the foundations of the preliminary model.

**Table 2.3-6: The underlying determinants of clustering**

<b>Supplier Specialization and Value Chains</b>	
(i)	companies cluster because of increasing returns that result from similar firms in the same sector
(ii)	value chains allow specialisation of services and products for similar disintegrated companies (same sector) leading to increasing returns (e.g. cost reduction, faster innovation, joint problem solving)
<b>Economic Diversification</b>	
(i)	concentration of unlike companies use the urban economy as the scale driver to achieve production advantages by sharing specialised services, common utilities and infrastructure
(ii)	diversified clusters are less vulnerable since there is a higher likelihood of the presence of companies that are effected positively by change

<b>Labour Pooling</b>	
(i)	accessibility to a large skilled labour pool attracts companies by enabling low hiring / firing cost and increased productivity and efficiencies
(ii)	critical mass of companies attracts further skilled workforce and reduces cost for specialised education
<b>Innovation and Knowledge Spillovers</b>	
(i)	innovation and knowledge spillover effects are enabled by trust, personal relationships, face-to-face contact, entrepreneurship and geographical proximity
(ii)	innovation and knowledge spillover effects are further determined by investment in R&D and the quality and size of the workforce
<b>Social Embeddedness and Supportive Institutions</b>	
(i)	clusters are seen as socio-economic system, characterised by active presence of both the community and a concentrated industry sector
(ii)	social embeddedness, supportive institutions, cooperative networks and trust are driving forces of agglomeration
<b>Investment Conditions</b>	
(i)	tailored capital conditions allow Neo-Schumpeterian innovation dynamics
(ii)	favourable terms and condition of capital will attract companies and enables growth of the cluster
<b>Local Demand</b>	
(i)	local demand for particular services and products enable economy of scale and attract further companies
(ii)	sophisticated local demand forces innovation and high quality which leads to a stronger cluster
<b>Balance of Cooperation and Rivalry</b>	
(i)	cooperation is favourable for a cluster development since combined support in shared areas will lead to increased returns
(ii)	local rivalry creates undeniable pressure to innovate, reduce prices and increase quality
<b>Entry and Exit Barriers</b>	
(i)	cluster barriers are of cultural, administrative and economic nature
(ii)	low entry barriers reflect dynamism which can be advantageous (e.g. competition, inflow of knowledge)
(iii)	high exit barriers reduce uncertainty and can increase the chance of further investments
<b>Firm Strategy</b>	
(i)	cluster will emerge and succeed if firm strategies are favoured by the regional environment (e.g. social norms, educational systems and government legislation)
(ii)	firm strategies supporting the development of the cluster leads to increased returns
<b>Entrepreneurship</b>	
(i)	entrepreneurship is a driving force for firm formation, new ideas, products and economic development
(ii)	entrepreneurship is a localised process due to area specific knowledge, investment conditions and social embeddedness which leads to clustering
<b>Path Dependence</b>	
(i)	clusters are to some degree path-dependent which implies that future opportunities are built upon existing economic activities
(ii)	revitalisation of traditional economic sectors by innovation (e.g. new technology and business practises)

## 2.4 Review of Sustainable Development

Any form of logistic agglomeration increases the competitiveness and strengthens the economic growth of a region (e.g. ESCAP, 2009; Meidute, 2007; Notteboom & Rodrigue, 2005). However, it is recognised that uncritical focus on the economic notion may have a harmful and irreparable effect to the region's eco-system and quality of life (e.g. Browne, et al., 2007; Geroliminis & Daganzo, 2005; Carley & Christie, 2000). In this context it was argued that logistics agglomeration in a metropolitan area should be

arranged to enable sustainable regional growth (e.g. DWC, 2010; Ketels & Memedovic, 2008, Van Dam et al., 2007; ILSCM, 2007a). Consequently, the concept of sustainable development, describing the complex and dynamic interdependency among economic development and the enhancement of natural and social aspects is seen as an integral part of a modern Logistics City-Clusters' development. However, no suggestions were found in the literature that provides an explicit explanation of how, and to what extent, Logistics City-Clusters strengthen the region in a sustainable way. Therefore a review in the field of sustainable development was necessary to strengthen this theoretical understanding.

### **2.4.1 The concept of sustainable development**

The concept of sustainability emerged in the 1980s when World Commission on Environment and Development (WCED) was created to study international concerns on the development of human kind and its actions towards the environment. It was in this regard that the nomenclature 'sustainable development', and its most quoted definition, appeared in the report 'Our common future': "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987, p.8). It was the base for many further summits and resulted in the establishment of 'The United Nations Commission on Sustainable Development' (UNCSD).

However, the definition from the WCED is not universally accepted and the understanding of sustainability, its goals and how these goals could be achieved, depends on individual interpretation (Lozano, 2008; Redclift, 2005). Therefore, it is not surprising that in 1992, more than 70 individual definitions occurred (Kirkby et al. 1995). As asserted by Ratner (2004) and McMichael et al. (2003), while the concept itself leaves not much room for direct opposition, it leaves great room for ambiguity. Interestingly, the nomenclature of sustainability was criticised very early by arguing that the lack of clear definition leads to subjective exploitation by groups' particular underlying motivations (e.g. Lele, 1991; Lohmann, 1990; Norgaard, 1988; O'Riordan, 1988). Whilst a universally accepted definition of sustainability seems unrealistic, there is a need for a clear understanding of sustainability to address the statement that a Logistics City-Cluster supports the notion of sustainable development.

It was in the early stages of this debate that Lele (1991) analysed the semantic and conceptual underpinnings of sustainable development. Distinguishing between trivial

conceptualizations and meaningful ones, he concluded that multidimensional interpretations of sustainable development that include the environmental, social and economic systems are of greater significance. This multidimensional understanding is now pre-eminent (e.g. Klein-Vielhauer, 2009; Adams, 2006; Kates et al., 2005; Ratner, 2004) and therefore it is this perspective that is integrated in this study. However various types of multidimensional frameworks, which also advocate a balanced approach of human, economic and environmental relations, have emerged.

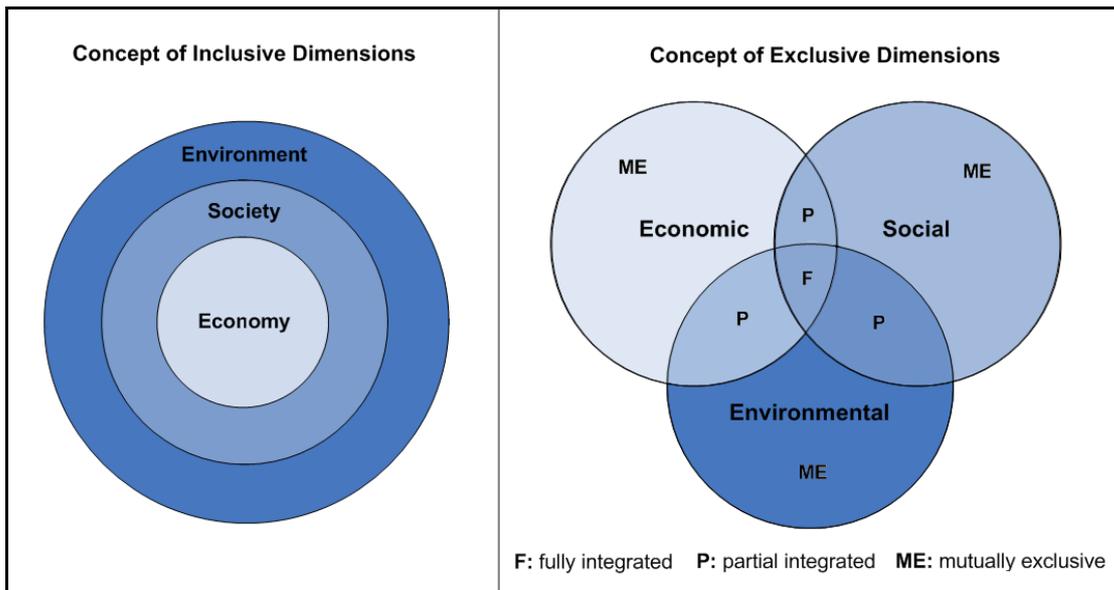
First, there are various approaches that focus on economic-environmental sustainability (e.g. Rees, 2002; Miller, 2002; Atkinson, 2000; Costanza, 1991). The core here is the balance of environment and economic systems to provide well being of mankind, based on the understanding that limited resources do not allow indefinite consumption. Therefore, natural resources should be used according to their capacities, without degrading the environment (Rees, 2002; Daly, 2002). In this context one framework is the 'The Natural Step' approach, which is practised by various non-profit organisations around the globe. It defines a sustainable society by four conditions that link the limitations of nature and the needs of economy in society (James & Lahti, 2004; Robert, 2002; Nattrass & Altomare, 1999). Another approach is the 'Ecological Footprint' framework that strongly focuses on the environmental impact of economic activities by comparing it to the limitation of the earth's resources and its ecosystem (Van den Bergh & Verbruggen, 1999; Walker et al., 1999; Wackernagel & Rees, 1996). This approach is known for its ratio-calculation of "how many earths" would be required to sustain a population and its associated way of life (Wackernagel et al., 2002).

However, it is argued that these approaches do not consider the importance of social aspects such as human rights, corruption, poverty or illiteracy (Lozano, 2008). Hence, there is a second core epistemological stance, which is nowadays the most accepted framework. This sustainability framework is referred to as the 'Triple Bottom Line' or 'The Three Circles' (e.g. Illge & Schwarze, 2009; Chan & Lee, 2008; Kunz, 2006; Luckman, 2006; Gibson, 2005; Elkington, 2002). Its focus is on the balance between economic prosperity, social equity and environmental quality. Importantly, it is widely argued that the balance of the three systems needs to be ensured in a short-, mid- and long-term perspective (Klein-Vielhauer, 2009; Lozano, 2008; Kates et al, 2005). Certainly, as stated in the Brundtland report it: "... *meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987, p.8), therefore it was decided to use this framework as the underpinning notion when examining Logistics City-Clusters regarding sustainability.

## 2.4.2 The 'Triple Bottom Line' approach

The first perspective (Figure 2.4-1) of the 'Triple Bottom Line' framework is that the three dimensions are overlapping concepts and are therefore not mutually exclusive (e.g. Lehtonen, 2004; Barron & Gauntlett, 2002; Mitchell, 2000). Based on this perspective the economy, a system grounded in exchanging goods and services, is an institution of society. Hence, society, which includes elements such as communities and culture, is a broader concept than the economy, but is itself a subsystem of the environment that provides the basic requirements such as air and water, upon which society relies. Consequently, it is argued that society, although it is reshaping nature, can never be larger than the environment (Mitchell, 2000). Importantly, it become conscious that created limits within the environment, such as pollution, will impact on the social and economic elements (Adams, 2006). In this understanding it is realised that the economic dimension cannot be treated as a single entity detached from the social and environmental dimension (Lehtonen, 2004). Consequently, sustainability, in this context, ensures that society meets its economic needs within the environment's limits (Lozano, 2008).

The second perspective (Figure 2.4-1) of the 'Triple Bottom Line' framework involves the dimensions that may be mutually exclusive (Lozano, 2008; Adams, 2006; Dalal-Clayton & Bass, 2002; Mebratu, 1998). In this understanding, only the overlapping space of the three components represents sustainable systems. The spaces outside of this threefold union of are considered either as partially sustainable; the union of only two circles, or are not regarded as sustainable. The twofold overlap of the economic and social elements is commonly referred as 'Socio-Economic Sphere', considering characteristics such as business ethics, fair trade and employment-rights (Lehtonen, 2004; Carroll & Stanfield, 2003; OECD, 2001). The space uniting the social and environmental dimension is the 'Socio-Environmental Sphere', which is associated with environmental justice, health, natural resource stewardship and demographic aspects (Barron & Gauntlett, 2002; OECD, 1998). The last partial sustainability of the economic and environmental elements is referred as the 'Environmental-Economic Sphere'. It considers notions such as resource efficiencies, life-cycle management and product stewardship (Carroll & Stanfield, 2003; Dalal-Clayton & Bass, 2002).



**Figure 2.4-1: Sustainable development – The 'Triple Bottom Line' approach**

Although there are fundamental differences in these theoretical stances, both perspectives are based on the integration of the three elements and their conflicting characteristics. Certainly, the dimensions have meaningful linkages. For instance the quality of the environment is important to the well-being of human mankind, as is the economic situation. In this interrelating context it is widely accepted that the central importance of industrialisation has driven the focus on the economic aspects, whilst causing hazards to the environment and societies (Lozano, 2008; Durphy et al., 2003; Dalal-Clayton & Bass, 2002). Consequently, it is not surprising that there is general consensus on a better balance of these dimensions (e.g. Kates et al., 2005; Adams, 2006; Lozano, 2008).

Interestingly, most literature does not clearly address the notion of each dimension. As Lozano (2008, p.1843) stated: *“Do they represent economic, environmental and social capitals? Or do they represent the impacts that each has upon the other two?”*. Nevertheless, it is fully understood that the three dimensions, due to their multidimensionality, cannot be analysed through the same indicators and tools (e.g. Lozano, 2008; Kates et al., 2005; Lehtonen, 2004). For instance, it is not possible or desirable to integrate economic metrics on life quality. At the same time it also understood that analysing the single dimensions or even a twofold interface is not optimal, since it would exclude relevant factors of missing elements. It is in this context that a brief review of the three dimensions was conducted.

### **2.4.2.1 The economic dimension**

Elements of the economic dimension on a micro-level are generally seen as margin and profit improvements, growth enhancement and creation of new market opportunities and innovation (e.g. Lozano, 2008; Lend, 2006; Adams, 2006; Porter, 2003). On a macro-level this is interpreted as creating jobs and economic growth potential for a region or nations (e.g. Lim & Ryoo, 2007; Aoyama et al., 2006; Ding & Liu, 2003; Limao & Venables, 2001), and includes the generated income for governments and the employed workforce (BTE, 2000). Indeed, the basic rationale of economic valuation, either on micro or macro level, is easily understood and a set of indicators exist to measure economic outcome (Ratner, 2004; Porter, 2000).

The economic system is a human institution and people's aspirations are strongly tied to performance measures (Adams, 2006). Therefore, the economic dimension has strong influential power on society and the environment, which can cause tensions (e.g. Chan & Lee, 2008; Kates et al., 2005; Murphy et al., 1995). For instance a strong focus on profit can cause environmental degradation such as deforestation (Adams, 2006; Marshall & Toffel, 2005). Additionally, it can result in a long-term social trade-off such as the accomplishment of new market potential which might negatively impact a regional culture (Kates et al, 2005; Lehtonen, 2004). Even more obvious, increases of productivity may reduce the need of labour or increases working stress (Lozano, 2008).

Consequently, it is important that the economic dimension needs to consider its interdependency with the environmental and social dimensions. This includes natural resources such as soil, trees, oil, water and air, which without the economic system would not exist in the first instance. Further, this also impacts on social aspects such as human rights and health, fair labour relations and business ethics (Dillard et al., 2008; Blewitt, 2008; Cohen, 2006; Porter, 1998), and is of great significance because of the increase in population and current levels of consumption (Adams, 2006). The vision is to decouple the historical and current setting of economic growth and exploitation of the environment and societies through the implementation of new processes and technologies (Adams & Jeanrenaud, 2008). It is believed that decoupling provides new chances for economic growth and profits through improved management processes, new products and technology (e.g. Cato, 2009; Hargroves & Smith, 2005; Daly, 2002).

As widely argued, the challenge is that current metrics are not telling the economic truth of the externalities towards social and environmental processes (e.g. Van Dam et al., 2007; Grazi et al., 2007; Adams, 2006). In this context Rosen and Gayer (2007)

state that externalities take place outside the economic process and are commonly seen as unlimited or free, leading to unanticipated exploitation and degradation. Hence, actors in the economy do not bear the full costs of production and consumption. However, it appears that this is changing and the relevance of natural resources is increasingly addressed by government strategies such as carbon emission trading schemes (Rosen & Gayer, 2007; Geroliminis & Daganzo, 2005). Also it appears that public demands for corporate responsibility are growing, since shareholders and customers become increasingly intolerant towards hazardous circumstances (Rondinelli & Berry, 2000).

#### **2.4.2.2 The environmental dimension**

The environmental dimension has received much attention within the last decades and therefore the understanding of the consequences on ecosystems due to human economic activities has advanced considerably (Grazi et al., 2007; Ratner, 2004). Generally, it is understood that healthy ecosystems, based on biodiversity and attaining atmospheric, water and soil balance, are essential for the health of social and economic dimension (Lozano, 2008; Daly, 2002; Miller, 2002; Rees, 2002). Supplementary, it is argued that the environment as a system has limits that should not be exceeded by any human activity (Illge & Schwarze, 2009; Rees, 2002; Wackernagel et al., 2002). However, as indicated earlier, the current economic system and its consumption behaviour is degenerating the natural environment leading to an irrevocable deterioration (Kates et al., 2005; WRI, 2000). Therefore, it was found that this dimension of sustainability is concerned with protecting and conserving ecosystems. Consequently, frameworks and indicators that integrate mitigating pollution of air, water and land, reducing waste and consider the current consumption pattern of society have been developed, as discussed in the next paragraphs (e.g. Chan & Lee, 2008; Grazi et al., 2007; Huesemann, 2003).

Human consumption, encouraged by the economic system, is recognised as a key driver that degrades the environment (Michaelis & Lorek, 2004; Jackson & Michaelis, 2003; Burgess, 2003; Heap & Kent, 2000). In this regard, ideas such as eco-design and eco-labelling emerged, fuelled by the power of global ethical consumerism (Fuad-Luke, 2006; Mason & Singer, 2006; Brower & Leon, 1999). A well known element of this ethical consumerism is recycling, which replaces the historical linear material path by a circular flow to increase resource efficiencies (Ratner, 2004; Anagnostopoulos et al., 2004; Anderberg, 1998). Ethical consumerism also led to 'Life Cycle Assessment', which is the holistic evaluation of social and environmental impacts throughout the

entire chain of production and consumption (e.g. Crawford, 2008; Cooper & Fava, 2006; Rebnitzer et al., 2004). Some scientists go beyond the direct evaluation of particular products, by considering components and materials that are indirectly involved. For instance analysis of the environmental impacts of the transport infrastructure life-cycle would also include the associated supply chain of the vehicle and its fuel (Facanha & Horvath, 2006; Spielmann & Scholz, 2005).

Currently the main focus of the environmental dimension is the reduction of emission and its negative environmental impact (e.g. Adams, 2006; Clarke & King, 2006; Oktay, 2004; James & Lahti, 2004). In this context, climate change and global warming associated with human created CO<sub>2</sub> has top priority due to its catastrophic effect on the earths' eco-system (Solomon et al., 2007). Beside CO<sub>2</sub> emission there are other toxic air pollutants such as nitrogen, sulphur oxides and chlorofluorocarbons (Stantchev & Whiteing, 2006; Ang-Olson & Schroerer, 2002). The reduction of emissions must be achieved, but population growth, the adoption of western lifestyle and globalisation leading to more transport activities mitigate against this attempt (Goodall, 2007; Geroliminis & Daganzo, 2005).

Further, water and land quality levels are recognised elements of the environmental dimension (e.g. Geroliminis & Daganzo, 2005; Graedel & Klee, 2002; IPCC, 2001). First, regarding water quality levels, it was observed that the central topics are associated with hazardous pollution of coastal maritime habitats and the over-exploitation of maritime resources such as fishing (Bates, et al., 2008; Hoekstra & Chapagain, 2007; Lindenmayer & Burgman, 2005; Woodwell, 2002). Lately, scientists have focussed their investigations on the linkage between climate and the ocean circulation patterns, due to their great impact on the earth's eco-system (Bates, et al., 2008; Kerr, 2004; Graedel & Klee, 2002). Secondly, scientific discussion regarding land quality levels is largely associated with the decrease of natural habitats due to their transformation for consumption purposes (Bramely & Power, 2009; Fung, 2004; Brovkin et al., 2004; Krebs, 2001). In particular, deforestation poses a major threat to the global eco-system due to the forests' crucial role in preserving soil and air quality (Chan & Lee, 2008; FAO, 2006; Groombridge & Jenkins, 2002). Also the use of land for agriculture purposes with its associated processes such as irrigation, fertilization and pest-control, degrade fertile soil and deplete water resources (Imhoff et al., 2004; Tudge, 2004). Apart from these concerns, there is the general topic of waste disposal and accidental spills of hazardous materials that has received recent attention (Bramely & Power, 2009; Rondinelli & Berry, 2000).

There is, in general, a focus on the preservation of a manifold biodiversity (e.g. Marshall & Toffel, 2005; Graedel & Klee, 2002; Gitay et al., 2002). As argued by various scholars, negative human influence, also linked to population expansion, accounts for one of the strongest mass extinction events on this planet, which might halve biodiversity within the next hundred years (e.g. UNPD, 2003; Woodwell, 2002; Wilson, 2002; Gitay, 2002; Hunter et al., 2002).

### **2.4.2.3 The social dimension**

The social element is the hardest dimension to grasp, due to the difficulty to quantify social phenomena that are often subjective and intangible (e.g. Bramely & Power, 2009; Partridge, 2005; Littig & Griessler, 2005). Based on the challenge of measurable and reliable indicators, the social dimension is the weakest understood and developed element (Cuthill, 2009; Kunz, 2006; Coenen et al., 2000). It is claimed by Lehtonen (2004) that this dimension becomes most concrete when considered on regional territories, based on the observation that the social elements are linked to the people and their daily life which are perceived differently around the globe.

Due to this difficulty of defining social sustainability, there are various generic frameworks. In this context, Kates et al. (2005) stated that the social pillar can be categorised in three core perceptions: (i) a generic non-economic social definition, (ii) human development as opposed to economic development and (iii) the notion of justice. Another perception of the social dimension is presented within Marshall and Toffels' (2005) sustainable four-level hierarchy framework. In their understanding, the existential needs of society are integrated in their level one and two category, dealing with basic requirements such as air, food and health. Social aspects of level three and four focus on human rights and actions linked to quality of life and social justice.

Barron and Gauntlett (2002) argue for a five element model, which are (i) equity, (ii) diversity, (iii) quality of life, (iv) interconnectedness and (v) democracy. Each category consists of various characteristics and indicators. Instead, Cuthill (2009) developed a social dimension framework that consists of four interdependent and reinforcing key components. First is the social capital being the theoretical foundation of this framework, the second is the social infrastructure which provides the operational perspective and third the element of social justice and equity that integrates the ethical imperative underpinning social infrastructure development. Finally the fourth element of engaged governance represents a method of stakeholders' cooperation. With regard to metropolitan areas, Chan and Lee (2008) have identified six critical factors of the social

dimension. Supported by other academics these are: (i) satisfaction of welfare requirements, (ii) conservation of resources, (iii) creation of harmonious living environment, (iv) provisions facilitating daily life operations, (v) form of development and (vi) availability of open spaces (Grange, 2004; Omann & Spangenberg, 2002; Corbett & Corbett, 2000).

Despite the huge range of frameworks, the social dimension can be generically regarded as the element that integrates the needs of individuals and considers their well-being, quality of life and equity (e.g. Cuthill, 2009; Blewitt, 2008; Cohen, 2006; Chiu, 2003; Enyedi, 2002). These core notions can be broken down to objective and subjective sub-components. For instance, components of well-being include health measures, housing opportunities and material possessions (e.g. Dillard et al., 2008; Lehtonen, 2004; Coenen et al., 2000). The notion of equity has elements such as fair distribution and access of resources, equality of rights and opportunities for all people in the community (e.g. Bramely & Power, 2009; Adams, 2006; Kates et al., 2005). Interestingly, it appears that social infrastructure is an integral part of the social dimension (Cuthill, 2009; Chan & Lee, 2008; Partridge, 2005). Whilst the focus on aspects of 'hard infrastructure' such as hospitals, schools, recreation centres and public transport is essential, the less tangible 'soft infrastructure' is also a crucial element involving the provision of community services and networks that creates capacity of community groups (e.g. Casey, 2005; Karoly & Bigelow, 2005; Marmot & Wilkinson; 2001). It is in this particular context that social networks integrate the belonging and participation of people in the community which is seen as a crucial element of this soft social infrastructure (e.g. Davidson, 2009; Gleeson, 2008; Polese & Stren, 2000). In essence, all these various notions refer to maintaining and improving the well-being, quality of life and equity for both present and future generations (Lozano, 2008; McKenzie, 2004; Chiu, 2003).

Interestingly, well-being is predominantly defined by material possession (Adams & Jeanrenaud, 2008; Orr, 2007; Adams, 2006), suggesting that the complex and broad system of social sustainability and its quality of life aspect is both driven and threatened by the economic concern. The drive for a higher standard of living can create macro socio-economic conflicts such as competition for natural resources or, when depleting the surroundings, impeding human health (Hak, et al., 2007; Orr, 2006; Le Billon, 2005; Zell, 2004; McKenzie et al., 1999). From a micro perspective, social-economic conflicts can occur when powerful single entities enrich themselves by exploitation of human

resources, leaving aspects such as work-life balance unconsidered (Soederbaum, 2008; Gleeson, 2008; Bookchin, 2007; Porritt, 2006).

### **2.4.3 Concluding sustainable development**

Sustainable development and its 'Triple Bottom Line' interpretation remains the focus of most global policy discussions and is nowadays embedded in a large number of national, international, and nongovernmental institutions (Dalal-Clayton & Bass, 2002). It has led to the realisation that a balance of these three dimensions is necessary to enable a liveable future (Cuthill, 2009). Although there are manifold publications and practical application of the 'Triple Bottom Line' approach, there are criticisms. The most discussed condemnation is that, due to its complex range of ideas, it is still ambiguous and lacks a sophisticated theoretical foundation particularly regarding the details of the three dimensions (e.g. Lozano, 2008; Adams, 2006; Springett, 2005; McKenzie, 2004). Its practical application is challenged, which leads to possible abuse based on individual interest, such as camouflaging environmental or socially destructive activities (Kates et al., 2005; Ratner, 2004). As Adams (2001) concluded, based on their particular objectives corporations define sustainability differently than governments. It seems that is due to two core reasons.

First, is the difficulty in bridging the wide competing interests of the three dimensions into strategic and operational levels (Cuthill, 2009; Ratner, 2004). It is argued that there should be no trade-off between the three elements; but in reality this appears to be impossible (Adams, 2006). As each dimension seeks to integrate multiple goals or values and these can be contradictory. Commonly, the trade-off on these values is in favour of the economy, causing challenges for the environment and social system (e.g. Grazi et al., 2007; Marshall & Toffel, 2005). Further, trade-offs are influenced by the multidimensionality of the involved actors' objectives (Lozano, 2008; Adams, 2001), thus, balanced action by the actors at all levels is required. However, it is also argued that the essence of sustainable development lies precisely at the interface between the conflicting objectives of economic development, social progress, and environmental protection (Lehtonen, 2004). It appeared that a change in the cultural behaviour of many societies is needed to bring the concern of nature, the well-being of society and the value of economic development together in a balanced way.

Secondly, there is lack of a suitable metric framework that presents, in a simple way, the progress of sustainable development programs (e.g. Kates et al., 2005; Lehtonen,

2004; Ratner, 2004). Sustainability is an ethical concept and therefore it is not easy to have quantitative measures that can be applied in a generic manner. There are various efforts to develop appropriate indicators and measurement frameworks (Parris & Kates, 2003), but Kates et al. (2005) concluded that the frameworks and their broad list of indicators<sup>7</sup> reflect the ambiguity of sustainability due to diverse stakeholders' perspectives and their varied aspirations. Moreover, the multidimensional nature of the frameworks and indicators represent temporary agreements that are embedded in current values and understandings (e.g. Cohen, 2006; Hukkinen, 2003; Vitousek et al., 1997). Consequently, without any practical framework and comparable indicators, it is easy to claim but hard to prove and justify (Adams, 2006; Norman & McDonald, 2004).

In many respects, understanding of sustainability and the interrelationships of the three dimensions has improved tremendously. The embedded ambiguity allows creativity and flexibility, which provides the space to apply this concept in macro (regional and global level) and micro (single company) domains (Aronsson & Brodin, 2006; Kates et al., 2005). Consequently, the appropriate unit of analysis in regards to sustainability for this study is the urban metropolitan region affected by the logistics industry. While it is posited that identified elements of the three dimensions would predefine ideas based on unrelated inappropriate objectives, such concerns are beyond the limits of this study. Instead, the core notions of the three dimensions based on the literature review (Table 2.4-1) are used as theoretical foundation for this investigation, which will inform the data collection and analysis to unlock the relationship between a Logistics City-Cluster and regional sustainability.

**Table 2.4-1: The core notions of the three dimensions**

<b>Economic Dimension</b>	<b>Environmental</b>	<b>Social Dimension</b>
(i) employment	(i) behaviour of consumption	(i) well-being / quality of life
(ii) growth of GDP in the region	(ii) air pollution	(ii) equity
(iii) income for workforce / government	(iii) degradation of land / water	(iii) social infrastructure
(iv) innovation	(iv) preservation of biodiversity	

## 2.5 Concluding the literature review

A number of metropolitan areas around the world have established international competitive logistics-intensive components in their regional economy in a Logistics City-Cluster environment. These can be found in coastal locations but also in less

<sup>7</sup> up to 255 in a single framework

obvious inland locations. Most locations are not specifically named Logistics City-Clusters, the underpinning concept, however, is of importance since it has gained acceptance as being a viable and unique regional development strategy on. Whilst the review on logistics nodes has constituted a first insight, there is an absence of an academically-founded conceptual description which adequately identifies its distinct characteristics and elements. In this regard, the review on cluster theories that take macro-strategic location factors into consideration revealed further ideas for the phenomenon of Logistics City-Clusters. It has allowed a theoretical insight into possible elements of clusters and factors that can influence its setup. However, as found clusters vary and cannot be explained by a single formal theory. Therefore, it was decided to combine multiple theoretical perspectives, presented as twelve determinants, to allow a deeper understanding of the multiple elements and dynamic perspectives of clusters. Indeed, the collective listings of determinants offer a better platform, upon which to theorise, yet at this stage there is no specific framework that discusses the agglomeration of logistics activities.

Various authors argue that the manifestation of logistics agglomeration in a metropolitan area can enable sustainable growth for a region, but current literature lacks the ability to explicitly describe how the elements of a Logistics City-Cluster strengthen and impact on regional development. Despite this absence of knowledge, the review on sustainable development identified the 'Triple Bottom Line' and its three dimensions as the core epistemological stance, which is used as theoretical foundation for this investigation.

Although the concept of a Logistics City-Cluster is accepted by industry as a unique concept and is currently being planned and developed, not many publications on this topic have been released. The specific body of knowledge of this regional development strategy regarding its composition, characteristics and actual effects on the region, is fragmented and very limited. However, growth of this concept makes it imperative that a scientific knowledge base be developed to ensure an orderly development of Logistics City-Clusters. Consequently, the aim of this study is to enrich this knowledge by developing a framework that provides a base for a better understanding of the phenomenon and represents a first step in filling this knowledge gap. In this context the objective of this research is threefold. Firstly, it seeks to develop a consensual definitional understanding of a Logistics City-Cluster. Secondly, it enquires to contribute to the theoretical knowledge of the enabling elements of the emerging Logistics City-

Cluster concept. Third, the study aims to explore the underlying assumption that the concept is a strategy which can contribute to regional sustainable development.

To achieve these aims and because of the limited literature and inherently subjective nature of the conceptual environment, the research will be of exploratory nature and has an inductive, interpretive and iterative character. Consequently, it will not commence with a formal hypothesis to be tested, but rather the derived capital notions from the three separate reviews will inform the data collection and analysis for this investigation. The chosen research paradigm, methodology and methods that will underpin the exploratory nature of the study, as described in the next chapter.

# Chapter 3

## The Research Design

### 3.1 Introduction

The first section of this chapter (3.2) describes various strategies that can guide the development of a systematic research design. Whilst the identified alternative approaches differ in the details of specific recommended steps for an investigation, there is a considerable overlap in the logical sequencing. This section concludes with the justification of Crotty's (1998) generic three-phase-research design that is applied in this study.

Against this context, the second section (3.3) locates the research within an appropriate paradigm, which, following Crotty (1998), is associated with the epistemological stance and the theoretical perspective. Because of the paucity of previous work in the area of Logistics City-Clusters this favours an exploratory research approach and consequently an inductive research paradigm was selected. Taking this into consideration, a constructivist epistemology and the use of a symbolic interactionist theoretical perspective is chosen.

The third section (3.4) justifies the selection of the research methodology. Based on the elaboration of possible methodologies that could be applied, it was decided that a modified Delphi methodology would be most appropriate to ensure a valid outcome. After justifying the modified Delphi methodology, its key principles are examined.

The fourth section (3.5) details the methods for data collection and analysis, which is the last phase of the research design. These are embedded within, and informed by, the chosen methodology. Three iterations were carried out and specific data collection and analysis methods applied to each round. The methods are discussed and explained with regard to the stages and circumstances of the research. Finally, the chapter concludes (3.6) with a reflection on the strengths and weaknesses of the research design and discusses the validity of the outcome.

## **3.2 Discussion of alternative research designs**

At the broadest level, research can be defined as a systematic investigation carried out with the intention of increasing our knowledge in the area of a problem. Research design, on the other hand, is the science of structuring the procedures of the research (Vogt, 1993). It involves an explicit systematic planning and strategy of the investigation to resolve a particular question (Davis, 2000). Inadequate research designs potentially yield unsuitable outcomes, thus in order to ensure a valid investigation several descriptions of research design is discussed and reasons for the eventual choice made have been noted.

Hussey and Hussey (1997) argue for an eight step research design. First is the identification of the research problem, followed by the determination of the research purpose and a description of the objectives. The third step is a sound literature review, which allows the collection of existing theories or models that underpin the fourth stage of deriving the research questions or hypotheses. Their fifth step of carefully defining the terms is an essential part of the research design, since it improves the precision of the study. The sixth step is the identification of the limitations and delimitations of the research and the final two steps are the selection of the appropriate methodology and the determination of the expected outcomes.

Contrasting with this pragmatic approach, Denzin and Lincoln (2005) explicitly include philosophical considerations of the paradigm into the research design and suggest five coherent stages. First is the location of the investigator in the tradition of research including the perceptual stance. Secondly, this will facilitate the establishment of the research paradigm that will guide the further process. The third stage is the selection of the methodology, which is followed by the selection of the data collection and analysis methods. Finally there is the arrangement of the practice to present the research outcome in association with meaningful evaluation criteria.

Sarantakos (1998) argues for an alternative three phase design: (i) the selection of an appropriate research paradigm explaining the world view, (ii) the selection of the methodology and finally (iii) the selection of the methods for data sampling and analysis.

A particularly accessible account is provided by Crotty (1998), who suggests four sequential phases. The first is the selection of the appropriate epistemology, which he

defines as the theory of knowledge that is intimately embedded in the subsequent steps. The choice of the theoretical perspective, the second step, will describe the philosophical stance that provides the framework for the research process and its logic. The third step is the selection of the research methodology, which Crotty (1998) defines as the strategy for the research activity. It underpins the last phase of the selection of methods for data collection and data analysis.

Although these different approaches have their own internal logic and structure, there are considerable overlaps of the approaches, and these can be conveniently summarised as a three-phase design (Figure 3.2-1).

	Denzin and Lincoln (2003)	Sarantakos (1998)	Crotty (1998)	Hussey and Hussey (1997)
<b>1. Stage Research Paradigm</b>	1. locate research within the traditions 2. establishing the research paradigm	1. select the research paradigm	1. establish the epistemology 2. establish the theoretical perspective	1. select the research paradigm
<b>2. Stage Methodology</b>	3. select the methodology	2. select the methodology	3. select the methodology	7. select the methodology
<b>3. Stage Methods</b>	4. select the methods	3. select the methods	4. Select the methods	

**Figure 3.2-1: Aggregation of research design approaches**

Despite these overlaps in the design strategies, there are important differences in the various research paradigms available to guide scholarly investigation (Sarantakos, 1998; Crotty 1998; Guba, 1990). At the simplest level, a research paradigm is understood as the logic that stands behind research and relates to assumptions about the nature of the world and the knowledge we have of it. Hussey and Hussey (1997) argue two main research paradigms. The first is the positivistic paradigm (characteristic of sciences) and the second is the phenomenological paradigm (characteristic of social and behavioural investigations). Whilst being somewhat didactic in their discussion, they warn that there is much ambiguity that exists in the naming convention (see also Crotty, 1998) and they provided a summery of possible nomenclature as indicated in Table 3.2-1 (Hussey & Hussey, 1997).

**Table 3.2-1: Synonyms for the main research paradigms**

Positivistic Paradigm	Phenomenological Paradigm
Quantitative Objectivist Scientific Experimental Traditionalist	Qualitative Subjectivist Humanistic Interpretivist

Beside this ambiguity in naming, there is also little agreement among scholars on the numbers of research paradigms. Whilst Lather (1992) and Creswell (2003) argue for only two paradigms, Lather (1992) named these positivist and post-positivist paradigms and Creswell (2003) labelled them the quantitative and qualitative paradigms. Sarantakos (1998) alternatively argues for three paradigms which he labels positivistic, interpretive and critical. Guba and Lincoln (2000), in contrast, propose four different paradigms, named positivism, post-positivism, constructivism and critical theory. Crotty (1998) on the other hand notes that the epistemology stance has three key metatheoretical elements that are objectivism, constructivism and subjectivism.

Although there is ambiguity in the names and numbers of research paradigms it is necessary to positioning an investigation in relation to qualitative and quantitative research approaches. In many treatments, these are seen as being strongly opposed on the research paradigm level (Denzin & Lincoln, 2005; Sarantakos, 1998; Hussey & Hussey, 1997). Instead, Crotty (1998) and Guba (1990) argue that the difference between these two approaches lies in the level of methods. They claim that in some instances qualitative research has been carried out in objectivist or positivistic manner. Indeed, much research can be conducted using qualitative, quantitative or mixed approaches. Therefore Crotty (1998) argues that an unambiguous epistemological perception of an investigation is of importance, since it intimately affects the nature of the questions and contribution to knowledge.

For this study, Crotty's (1998) design framework was chosen in order to establish a systematic strategy to resolve the questions. Whilst it is one of many useful perspectives, he has a more universal view that any research study is capable of being investigated by qualitative or quantitative methods, independent of the chosen metatheoretical level (paradigm). This flexibility was decisive in the selection of the research design, because initially it seemed that this research could be profitably pursued in a qualitative or quantitative fashion. The following paragraphs will discuss the positioning of this study within Crotty's (1998) research design.

### **3.3 Description of the research paradigm**

A metatheoretical understanding of an investigation determines the set of beliefs that will guide the research process and this has implications for the selection of the methodology, data collection and analysis. Crotty (1998) put this most precisely when he said *'different ways of viewing the world shape different ways of researching the*

*world'* (p.66). His assignment of research paradigm is particularly concerned with the concepts of epistemological stance and theoretical perspective.

### **3.3.1 Constructivism: The underpinning epistemology**

Crotty (1998) argues for three key metatheoretical elements which he calls objectivism, subjectivism and constructivism representing different understandings of the nature of knowledge.

*Objectivism* is underpinned by a belief that there is universal truth that will be uncovered by applying systematic research where values and other confounding subjective factors are excluded. This universal truth or reality lies in the object that is driven by immutable natural laws and mechanisms, which are summarized in time-independent and context-free generalizations (Guba, 1990).

*Subjectivism* argues that the meaning or truth of a situation is imposed by the subject. Hence, the object itself is secondary in the development of meaning or truth and the subject creates truth in a very personal way (Crotty, 1998). In the extreme case, it is argued that the nature and existence of objects depends solely on a subjective awareness of it.

*Constructivism*, however, is a more pragmatic mixture of those two epistemologies. It relates to research investigations which reject the view that there is a single objective truth to be discovered, and it is the interplay of actors (subjects) with their environment (objects) that creates shared meaning and truth. It is because of this sharing between actors that constructed meanings by individuals will contain elements of sameness, although they may be tempered with some idiosyncratic experiences. Consequently, different people, at different times and places, construct their meaning in alternative ways (Crotty, 1998). As Guba (1990) argues, '*knowledge is a human construction, never certifiable as ultimately true but problematic and ever changing*' (p.26).

Logistics Cities-Clusters are an emerging concept, and are developed in response to specific contexts, experiences and economic needs of practitioners in different regions. Whilst it is clearly subjective as its meaning and understanding may vary according to an individual's perception, the fact that key players in the Logistics City-Clusters field are intimately aware of other positions and opinions provides a base level of agreement. Hence, this nature of the concept means that a constructivist theory is

appropriate as the underpinning epistemology, which emphasises that the source of knowledge lies with the social actors that are most intimately involved with the concept. Interestingly, Fenner et al. (2005) state that the complexity of issues arising in science and engineering investigations where social considerations are involved, needs to include the constructivist epistemology<sup>8</sup>. Indeed, this investigation into the nature of Logistics City-Clusters is a prime example of a complex issue where researchers are increasingly favouring a constructivist approach.

### 3.3.2 Interpretivism: The underpinning theoretical perspective

The theoretical approach of 'Interpretivism', specifically that of symbolic interaction, was chosen to inform this investigation on the basis of the highly emblematic nature of the Logistics City-Cluster concept. Taking a symbolic perspective of the basic social interfaces involved in the construction of complex concepts, suggests that actors associated with Logistics City-Clusters will develop attitudes and values from interaction within these various elements. This well-known and often utilized theoretical perspective is underpinned by constructivist epistemology and comprises five main principles (Table 3.3-1: Robson, 2002).

**Table 3.3-1: The five core principles of 'Symbolic Interaction'**

I.	The reality and knowledge are formed by subjects and objects only become significant when meanings are being assigned by the subjects, which can vary according to the interpretive process.
II.	The shared reality is expressed through symbols, where language is the most important symbol used in social contexts.
III.	The understanding of the individual subjects' interpretation of the objects needs to be derived by studying the structure, function and meaning of their symbols.
IV.	The meaning emerges from the analyses of the symbols that represent the data.
V.	The chosen methodologies and methods must allow individuals to freely express themselves.

### 3.4 Methodology: The modified 'Delphi Study'

The focus of this section is to explore possible research methodologies that are strongly underpinned by the chosen epistemology and theoretical perspective, eventually leading to the reasons for selection and justification of the modified Delphi methodology as the most suitable approach. This is followed by a review of the four key principles of the modified Delphi methodology and their positioning in this research study.

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<sup>8</sup> Constructivism is not only recognised by social sciences and business management, it is lately being included in the 'Engineering Department' of 'Cambridge University'.

### 3.4.1 Investigation of possible methodologies

During a discussion of ‘real world’ research that involves a significant element of exploratory work, Robson (2002) advises that a researcher should ‘*consider using a methodology for enhancing creativity*’ (p.57). There are several methodologies that are consistent with the tenets of constructivism and symbolic interaction. Any of the methodologies visualised in Table 3.4-1 could be applied to this investigation, since their main premises are that reality exists only as a meaningful interaction between individuals. The methodologies are briefly described in the next paragraphs.

**Table 3.4-1: Possible research methodologies**

<b>Action Research</b>	<b>Hermeneutics</b>	<b>Ethnography</b>	<b>Case Study</b>	<b>Delphi Study</b>
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The aim of ‘*Action Research*’ is to find an effective way of bringing change in a partly controlled environment and to monitor the resulting effects. Consequently, it is closely linked to problem solving within a specific organisation (Hussey & Hussey, 1997). Previous understanding of the environment is necessary before conducting the research, and the organisation and the investigator must determine a common goal regarding the change. This study, however, does not aim to bring a change in a particular Logistics City-Cluster environment, which suggests that an action research methodology is not suitable.

‘*Hermeneutics*’ focuses on the interpretation of texts and their related meanings to create relationships of experience to their underpinning structures. It is often applied in the field of law to understand reasons behind the framing of regulations and legal judgements (Hussey & Hussey, 1997). Hermeneutics is applied in any study that aims to uncover historical meaning (Lindlof, 1995). However, although a historical account of the Logistics City-Cluster development would be of interest, the existing literature sources relating to this study are too limited. More importantly, the concept is rapidly developing, and rather than attempting to find a ‘historical meaning’, it is of more interest to unlock ideas for future innovation in this area. It was therefore decided not to consider this methodology.

The focus of ‘*Ethnography*’ is to understand the patterns of human activity within a defined organisation or culture through full time observation (Hussey & Hussey, 1997). Examination of the literature on Logistics City-Clusters implies that there are various stakeholders engage in its functioning, also being sensitive to local political and

geographical backgrounds. To prepare a model of the type envisaged in this study, it is essential to integrate diverse backgrounds and their understanding on key functions. Regrettably, time and resource considerations exclude the opportunity of being a full time member of multiple stakeholders associated within various clusters. Hence, ethnography is perceived as an inappropriate methodology for this investigation.

'*Case Studies*' are designed to understand the dynamics which take place within a particular phenomenon. Eisenhardt (1989) argues that it is a detailed examination of a single instance focusing upon a single unit of analysis. Other authors claim that case studies can also have a multiple design that follows a replication approach rather than a sampling logic (Yin, 1994). However, the current study aims to obtain a variety of perspectives from different Logistics City-Clusters, rather than to replicate ideas. Furthermore, a key requirement of case studies is the existence of thick concept description, and since there is a paucity of literature, a significant limitation of the study is obvious. Therefore, although this methodology is consistent with the aim of the investigation, is not entirely suitable.

'*Delphi Study*' is mentioned as a creative methodology that is effective when conducting exploratory research (Robson, 2002). This methodology, developed in the 1950s by the Rand Corporation (Dalkey & Helmer, 1963), was created as a forecasting technique based on collective opinions of experts (van Zolingen & Klaassen, 2003). In most instances, these experts are kept anonymous to prevent biases arising from peer pressure from influential individuals. It relies upon generating consensus within the group involved and refers to an iterative process of systematic solicitation and collation of judgements (Saldanha & Gray, 2002). The iterative process is enabled through a set of sequential data collections and analyses interspersed with summarised information derived from the participants' feedback (Young & Jamieson, 2001; Delbecq et al., 1975). Questionnaires are commonly used in the iterations, starting with open questions to establish themes, which are then presented back to the respondents as structured surveys that need to be rated. The final outcome, the result of these exhaustive iterations, represents the consensus of the experts (Powell, 2003).

The Delphi methodology is accepted as a process structuring communication among experts that can provide valuable contributions to contested issues. However, nowadays the strict use of Delphi methodology as a forecasting tool is rarely practised and more pragmatic aims have emerged, as summarised in Table 3.4-2 (e.g. Hsu & Sandford, 2007; Landeta, 2006; Ariel, 1989).

**Table 3.4-2: Pragmatic aims of ‘Delphi-Studies’**

- to determine or develop a range of possible program alternatives;
- to explore or expose underlying assumptions or different judgements;
- to seek information which may generate a consensus within a respondent group;
- to develop a framework by correlating judgements spanning a range of disciplines;
- to educate a respondent group as to the diverse and interrelated aspects of a topic;
- to elicit information and judgements to achieve problem-solving;
- to explore the course of actions, their consequences and feasibilities.

It is widely accepted that modification of the original Delphi technique are used for policy determination, program planning, framework development and resource allocation in areas such as social sciences, economics, engineering and logistics (e.g. Hsu & Sandford, 2007; Keeney et al., 2001; Czinkota & Ronkainen, 1997; Gupta & Clarke, 1996).

Indeed, traditional Delphi approaches apply questionnaires in all iterations that are always sent to the same panel. However, the modified Delphi methodology enables flexibility in regard to data collection methods (Engels & Kennedy, 2007). Individual interviews and focus groups, in combination with questionnaires, are nowadays accepted data collection methods (e.g. Reynolds et al., 2008; Nevo & Chan, 2007; Boote et al., 2005). These qualitative methods are commonly included in the beginning of the investigations, but can also be applied in the middle of a Delphi study. Additionally the number of informants involved in each round can vary, according to the methods (e.g. Engels & Kennedy, 2007; Wellington, 2000). It is claimed that the multi method approach enhances data wealth, credibility and validity. A further modification is that the final consensus does not need to be forced, but rather allows exploration of both agreement and divergence (Hsu & Sandford, 2007).

### **3.4.2 Justification for using a modified ‘Delphi Study’**

The traditional Delphi methodology, although it is consistent with the epistemological stance, is inappropriate, because of the study’s complexity and objectives. However, the modified Delphi approach appeared to be more useful in exploring the Logistics City-Cluster concept, allowing a valid and rigorous outcome. Modified Delphi studies are commonly used for exploratory research, but it is also applied in research where variables are already developed, by drawing up current understandings to enhance scientific or technical knowledge (Engels & Kennedy, 2007; Hwang, 2004; Cottam et al., 2004; Meier et al., 1998). Clearly, the Logistics City-Cluster concept is a relatively new with few variables developed, and, additionally, limited studies on agglomeration

of logistics activities have been conducted to date. These observations strengthen the claim that a modified Delphi study is appropriate to obtain valuable information in this largely unexplored field. There are five additional reasons for its applicability.

First, modified Delphi approaches attempt to generate constructive and systematic use of informed judgement and knowledge through administering a series of statements of a selected expert group towards a particular object (Hwang, 2004). This underpinning notion is consistent with the chosen epistemology and supports the idea of how knowledge is constructed.

Second, it allows multiple methods, both qualitative and quantitative (Powell, 2003; Jairath & Weinstein, 1994). This is consistent with Crotty's (1998) argument that these approaches are linked at the level of methods and not the research paradigm. Hence, the combinations of multiple methods will strengthen the outcome of this study without contradicting the basic applied constructivist approach.

Third, a modified Delphi study provides anonymity to the participants. This supports the use of quantitative methods and reduces bias during data collection. Inbuilt allowance for anonymity enables all panel members to be free of peer pressure, since there is no hierarchical structure obvious for the participants that may discourage some panel members giving feedback (Islam, 2005; Douglas, 1983).

Fourth, it is very flexible in regards to the number of participants. Expert panels can vary from 10 to over 1500, depending on the aim of the research project (Hasson et al., 2000; Reid, 1988). This flexibility is a great advantage when combining different methods. Hence where a large survey may not be able to be arranged, a small group of acknowledged experts can provide suitable opinions in the field (Meyrick, 2003).

Fifth, the Delphi methodology was applied and is widely accepted in various aspects in logistics research. In 1992 and 1999 Cranfield University used this approach to forecast the future of logistics in Europe. The research study accessed the opinions of 200 experts from six countries using two feedback iterations (McKinnen & Forster, 2000). The Delphi approach was also used to investigate whether coastal shipping could be integrated into a multimodal door-to-door supply chain (Saldanha & Gray, 2002) and to identify the difference between logistics services and traditional shipping services (Hwang, 2004). MacCarthy and Atthirawong (2003) investigated factors that influenced the location decision making of logistics sites, based on a worldwide panel

of experts. Ogden et al. (2005) used a multi-round approach to examine strategies of procurement and supply chain management, whereas Islam et al. (2006) explored the dimensions of multimodal freight transport in developed and developing countries, leading to a ranking index. Recently this methodology was also used to examine reverse supply chains (Wu & Cheng, 2007), to identify challenges of inventory management (Boone et al., 2008) and to analyse supply chain performance measurements (Keebler & Plank, 2009). This excerpt of Delphi applications demonstrates its validity for the logistics sector and therefore its application to this study.

### **3.4.3 Key principles of the applied modified ‘Delphi Study’**

The Delphi approach can be characterised by four key features: (i) expert panel, (ii) iterative rounds, (iii) feedback and (iv) anonymity of responses (e.g. Hsu & Sandford, 2007; Powell, 2003; Yong et al., 1989). These principles and their application in the modified Delphi study are discussed in the next paragraphs.

#### **3.4.3.1 The role of the expert panel**

For any in-depth investigation, the sampling of potential informants is of critical importance and driven by the nature of the research question and the perspective that is being sought (Merriam, 1988). Indeed, the quality of the participants is the key to the veracity of the outcomes. There are two legitimate approaches to sample selection: (i) probability sampling, that underpins such approaches as random and stratified sampling and (ii) non-probability sampling that includes incidental, consecutive and theoretical sampling. The choice between these approaches lies in the investigation’s epistemological stance. The probability approach focuses on an equal chance for any unit in the population to be selected, whilst, by contrast, non-probability sampling allows the deliberate choice of expert informants with no regard to the probability estimation of any particular element (Minichello et al., 1995).

Because of the studies’ constructivist perspective, theoretical sampling (systematic non-probability approach) seems to be the most appropriate technique. Given that non-probability sampling is the standard procedure for exploratory research (Sarantakos, 1998), it is also appropriate since contributors of Logistics City-Clusters are extremely diverse and the possibility of ensuring an equal probability of perspectives is difficult. The technique of theoretical sampling does not aim to be exhaustive or representative of a particular population, but, in concert with constructivist principles, it allows a

systematic purposeful selection of participants on the basis of their specific perspective and knowledge (Glaser, 2001; Minichello et al., 1995; Merriam, 1988).

It is the panel's opinions and judgments that are elicited and analysed; consequently the information obtained by this Delphi study is only as good as the participants' contribution. Hence, a clear framework for the purposeful selection through theoretical sampling was defined and is built from two categories: (i) the 'Geographical Position' and (ii) the 'Strategic Stakeholder' role (Table 3.4-3).

**Table 3.4-3: Sampling framework**

<b>Geographical Position</b>	<b>Inland</b>			<b>Coastal</b>		
<b>Strategic Stakeholder</b>	<b>Industry</b>	<b>Government</b>	<b>Academic</b>	<b>Industry</b>	<b>Government</b>	<b>Academic</b>

International trade gateways appeared to be a critical factor for Logistics City-Clusters. Since most of the world's trade is accomplished by sea, the seaports that have evolved from single transportation hubs into multifunctional logistics centres (Zhao et al., 2007; ESCAP, 2005) need to be considered in this investigation. Additionally, logistics clusters are not only located around seaports, but can be located in less obvious inland locations (Van der Lugt & de Langen, 2005; Meijboom & Rongen, 1995). Indeed, it seems that coastal and inland Logistics City-Clusters strongly differ in their characteristics, based on the type of associated core trade gateways. Hence, the first level of the sampling framework is separated into the coastal and inland geographical locations that have sophisticated concentration of logistics activities.

As discussed in the literature review, there are many different stakeholder groups associated with any logistics agglomeration, which are often divided into two major categories; the public government and the private industry sector. However, in addition to these, there is the important academic sector. The involvement of this group can strengthen the quality of the study, since they provide comprehensive insight from a third perspective. Rowe (1994) and Ludwig (1994) suggest that experts should be deliberately drawn from various backgrounds in order to guarantee a rich description. Hence, the two first level dimensions will be associated with the three sub-classifications: (i) industry, (ii) academic and (iii) government.

The informants for the Delphi study should be selected for their knowledge, experience and credibility in the field of the investigation (e.g. Hsu & Sandford, 2007; Powell, 2003;

Jacobs, 1996). Additionally, Ludwig (1994) and Delbecq et al. (1975) suggest that Delphi experts should be top decision makers and informants whose judgements are widely sought in the area. Hence, a set of quality criteria for the selection of actual participants for this study was set up (Table 3.4-4).

**Table 3.4-4: Participants' selection criteria**

- |   |
|---|
| <ul style="list-style-type: none"><li>• individuals in a senior management position;</li><li>• individuals that have a sophisticated understanding of the logistics industry;</li><li>• individuals in a position to influence the setup of a Logistics City-Clusters;</li><li>• individuals that are involved for a substantial time in the three stakeholder sectors.</li></ul> |
|---|

This sampling framework facilitated the search for appropriate informants. However, the complex structure of Logistics City-Clusters regarding seniority and competency made the direct identification of appropriate interviewees somewhat difficult. Therefore, a 'snowball' approach, asking external sources or initial interview partners for appropriate contacts, was conducted to support the identification of valuable participants, which is widely accepted in exploratory investigations (Tuck, 2007).

There is no consensus on the number of participants to ensure a valid outcome, and it is commonly argued that it depends on the allocated resources (Hsu & Sandford, 2007). For example, Ludwig (1997) suggest 10 to 20 experts; whereas Witkin and Altschuld (1995) hold that a suitable panel consists of less than 50 experts. Previous research indicates that sample sizes vary between 10 and 1685 participants (Reid, 1988). The expert panels for this study have been designed by considering resource restrictions and, since a modified Delphi technique as been applied, the size of the panel was adapted according to the data collection method of the iterations.

### **3.4.3.2 The use of iterative rounds**

In contrast to many other methodologies, the modified Delphi study employs multiple iterations, the number of which depends on the aim, time and cost factors of the study (Green et al., 1990). Although the amount of iterations vary from two to 10 (Hasson et al., 2000), it is widely accepted that three iterations are sufficient to collect the needed information and to achieve an appropriate level of consensus (e.g. Hsu & Sandford, 2007; Custer et al., 1999; Ludwig, 1997). For this investigation, three iterations have been decided upon as appropriate for collecting and reviewing the major notions to reach an unforced consensus on most issues, whilst leaving space for possible divergences. The three iterations will be briefly introduced and discussed later in detail.

#### *Round 1: Establishing Themes*

The first iteration is commonly unstructured, to facilitate open responses and allow free elaboration of core perceptions towards the topic under investigation. In this modified approach a detailed study of the relevant literature and an invitation for two eminent executive individuals to openly comment on the Logistics City-Cluster concept in an unstructured interview was carried out. This open discussion added valuable insights into the initial understanding abstracted from the literature, and indicated how current ideas had moved forward since these publications were written. The major issues addressed in this iteration resulted in a preliminary model of a Logistics City-Cluster.

#### *Round 2: Asses Themes*

In the second round a questionnaire asking an expert panel to rate and rank ideas is commonly carried out. However, this study applied an intensive qualitative data collection using semi-structured face-to-face interviews with selected executive e in four established and growing Logistics City-Clusters. The preliminary model of the first iteration was used to prepare the detailed semi-structured interview schedule. The interviews were anticipated to establish deeper insight and consensus on the emergent ideas, but also to identify participants' perception of new elements regarding the concept. As a result of this data collection and analysis, an elaborated Logistics City-Cluster model was developed and the major findings, here the core categories, the sub-categories and their properties, provided the basis for the third iteration.

#### *Round 3: Validate Themes*

In the third iteration the traditional approach of a survey was carried out. Hence, the elaborated theoretical construct from the second iteration was presented via a questionnaire to 44 experts, including the respondents involved in the earlier iterations. These experts were asked to rate their level of approval on statements derived form the elaborated framework and were given the opportunity to clarify the notions and ratings as presented. This additional clarification was critical to provide a rich qualitative description on the model and its final consensus and possible divergences. As a result of this round, the final Logistics City-Cluster framework was developed and implications were drawn.

### **3.4.3.3 The process of controlled feedback**

Controlled feedback includes the summary of the data collection and analysis. The summary is forwarded to the experts who then have the opportunity to reconsider or provide additional insight and to clarify essential concepts. This feedback procedure

has the effect of reducing the 'noise' as part of a group process and strengthens the focus on problem solving instead of on individual interest (Hsu & Sandford, 2007). The controlled procedure assures that statements relevant to the experts deepens the shared understandings and helps to appreciate the sources of consensus or deviation. This process was strictly applied to assure a valid and unbiased development of the Logistics City-Cluster framework. At the end of each round, the summary has been the basis for the next iteration, thus allowing the development of more insight, clarification and unforced consensus. Although the time between the rounds was relatively long, it has not impacted on the quality, since the modified Delphi approach applied here, incorporates an increase of experts in the iterations (Engels & Kennedy, 2007; Wellington, 2000).

#### **3.4.3.4 The anonymity of response**

Anonymity of response played an important role in this investigation. The expert panel members did not meet face-to-face, alleviating the social pressures of group dynamics, hierarchical differences and dominant individuals (Hsu & Sandford, 2007; Woudenberg, 1991). Hence, free expression of perceptions towards the topic was facilitated. Confidentiality was also assisted by the geographical dispersion of the experts and by having separated data collection events (Fadda, 1997). It must be mentioned that in the second iteration, in two out of 10 interviews more than one expert from a stakeholder group participated. Therefore, a 'true' anonymity throughout the entire Delphi investigation was not fully achieved. However, the inclusion of a second participant was requested by the managerial participants to provide the best insight after receiving the interview guideline a month before the meeting.

### **3.5 Data collection and analysis methods**

As discussed earlier, the applied modified Delphi approach employs three iterations to reach an unforced consensus on the research issues whilst still leaving space for divergences. Each of the three rounds applies specific data collection analysing methods, which will be detailed here.

#### **3.5.1 Methods applied in 'Round I'**

The initial review of the literature suggested that, although Logistics City-Cluster concept is currently contested, there was an emerging pattern informing the concept and its regional effects. After refining the research aim, the literature was revisited. In order to avoid the presumptuous acceptance of a preliminary model, the data collection

also included two unstructured interviews with eminent practitioners in the area. The data collection generated a large volume of information that needed to be systematically comprised and organised into fewer categories and sub-categories. Content analysis is a powerful method for data reduction in the exploratory environment and was employed here. The search of the data was informed by a set of words and notions arising from the research aims. The next two paragraphs describe the details of the applied methods of data collection and analysis.

### **3.5.1.1 Data Collection: Literature reinterrogation and un-structured interviews**

The exploratory nature of the investigation meant that the first round of data collection was unstructured, having the intention to provide an overview of current perspectives that allowed the development of a first framework. The literature is an existing source of secondary data and included refereed papers, presentations as well technical and governmental reports. It allowed coverage of a broad spectrum of ideas such as the exploration of Logistics City-Clusters in general, the evolution of gateways, cluster theories and sustainable development.

Additionally, two un-structured interviews were conducted without specific pre-formulated questions placed in a predetermined order. This method of data collection is an appropriate tool for exploratory research to help understand a particular construct from the knowledge and experience of experts (Hussey & Hussey, 1997; Easterby-Smith et al., 1991). Hence, the emphasis was to acquire rich insights to support the development of a preliminary model from primary data sources (Alvarez & Urla, 2002; Johnson, 2001). Whilst these interviews followed no strict guideline; there was a focus on the information to be collected by using the research questions as a broad agenda (McCann & Clark, 2005). Five rules (Table 3.5-1), which will be described hereafter, were applied in the interviews (Fontana & Frey, 2005).

**Table 3.5-1: Five applied interview rules**

<b>I.</b>	locating the informants and understand their background;
<b>II.</b>	avoiding leading questions;
<b>III.</b>	exploring inconsistencies;
<b>IV.</b>	probing beyond possible expected outcomes and
<b>V.</b>	data capturing.

*Locating the informants and understand their background*

The possible interviewees need to be knowledgeable in the field to ensure a valid data collection (Fontana & Frey, 2005). Their perspectives are governed by education, experience, status and culture; consequently it is important to understand the background of the participants so the collected data can be put in context (Fife, 2005). Consequently, the participants were purposefully chosen. In the early stage of this research, it was decided to conduct interviews with only two senior executive participants that have had significant influence on the development of their associated Logistics City-Cluster (Table 3.5-2).

**Table 3.5-2: Round I sampling: Coastal Logistics City-Clusters<sup>9</sup>**

Logistics City-Clusters	
Dubai	Singapore
(i) most communicated in the world due to its holistic approach and just recent appearance	(i) host the biggest container port in the world and one of the biggest freight airports
(ii) associated with the 7th biggest container port in the world as well as the 'Dubai International Airport'	(ii) has one of the most sophisticated hub connectivity for maritime and airfreight trade
(iii) Al Maktoum International Airport' under development / when finished the world's largest passenger and cargo hub	(iii) has the highest ranking in the 'Worldbank - Logistics Performance Index'
(iv) very strong financial support by the Sheikh to be the future central Logistics City-Cluster in the world	(iv) host the National University of Singapore which incorporates the leading Logistics Institute - Asia Pacific
Industry Interviewee	Academic Interviewee
<b>Michael Proffitt</b>	<b>Prof. Dr. Sin Hoon Hum</b>
(i) CEO of Dubai Logistics City from 2005 till 2008, now advisor to the new CEO	(i) executive dean of the 'National University of Singapore'
(ii) instrumental in developing the Logistics City from its inception in 2005	(ii) expert in operations strategies, modelling analysis of logistics systems, performance measurement
(iii) extensive experience in logistics and held senior executive position in the UK, Switzerland and Germany	(iii) conducted executive research and consultancy in Singapore for the government, port authority and industry

*Avoid leading questions*

Leading questions that imply answers were avoided, instead open-ended questions were used to elicit spontaneous feedback by allowing the experts<sup>9</sup> to express themselves in their terms and their words (Gubrium & Holstein, 2001). Because the direction of an unstructured interview can change at various times and in order to adjust to these possible changes, the investigator practised the process of developing non-leading questions beforehand with an experienced supervisor.

*Exploring possible inconsistencies*

Inconsistencies or contradiction can occur during the interview and commonly reflect misunderstood questions or various personal perceptions about a topic (Patton, 2002).

<sup>9</sup> The interviewees agreed to be named.

Any inconsistencies that occurred were explored without offending the interviewee to clarify misunderstandings or to gain new insights.

*Probing beyond possible expected outcomes*

Probing includes the technique of asking the same question in a number of different ways to strengthen understanding (Gubrium & Holstein, 2001). The process of probing is not easy and a number of challenges were experienced in this investigation. For example, one participant responded that the question was asked before and that he would give the same answer. Nevertheless, continual probing allowed rich insight beyond mere substance and strengthened the veracity of the data.

*Capturing the data*

It was decided to take field notes during the interviews due to the open exploratory approach. The rewriting of the field notes, to summarise and prepare the information for analysis, after the interviews was necessary, since a fresh memory eased the reconstruction of the notes.

**3.5.1.2 Data Analysis: Content analysis**

The first stage of data collection generated a large volume of information and content analysis was used to condense the material. At this early stage of the research it was a powerful technique to systematically compress the data, from documents and interviews expressed primarily by written and spoken symbols, into fewer categories and properties (Krippendorff, 2004; Hussey & Hussey, 1997; Silverman, 1993). There are a range of rules to break down large amounts of information and in this study the collected data were intensively explored by addressing five steps (Table 3.5-3: Krippendorff, 2004).

**Table 3.5-3: The five steps of ‘Content Analysis’**

<b>I.</b>	What are the codes and how flexible should they be?
<b>II.</b>	What is the appropriate level of coding (frequency or existence)?
<b>III.</b>	What is the level of code generalisation (exact or implied coding)?
<b>IV.</b>	What kind of coding process should be used (manual or automatic)?
<b>V.</b>	What kind of weighting is set on the data sources?

The core research questions and their sub elements provided the pre-defined ideas around which the literature and the interviews were coded. It was important to allow a certain level of coding flexibility, so that additional ideas could be incorporated into the

analysing process. This flexibility in the coding process was enabled by not only searching for single words, but rather for sets of words that have similar meaning, which takes into consideration that words have multiple meaning, depending on people's perceptions (Weber, 1990). Hence, the search for a single word such as 'scope' was replaced by notions such as 'value, scope and purpose of a Logistics City-Cluster'.

After the development of the code list, it was debated whether frequency of use or occurrence of the codes should be explored. The general assumption is that, when applying a word count, the most often used code is the one of greatest concern (Weber, 1990). This kind of quantitative emphasis will not occur when simply coding for existence. At this stage only notions were being explored, therefore it was decided not to apply a numerical word count, which is more appropriate for single codes. However, if certain words appeared multiple times in various data sets, this was noted and consequently influenced the analysis.

In regards to generalisation of codes, it needed to be determined if the codes should be recorded separately as they are found, or rather be recorded under one common set of words when the meaning is similar (Krippendorff, 2004). It was decided that codes would be submerged into categories if different expressions imply the same meaning. For example, when an interviewee talked about 'job creation' and in the documents a statement appeared about 'employment possibilities', no separation were made. Hence, a translation sheet integrated with the code list was developed, representing on one side the specific notion and on the other a possible set of words that imply its connotation. This eased the coding and analysis as well as providing a level of coherence (Weber, 1990).

Whilst it is recognised that coding can be conducted either manually or using special software packages, because we applied various set of words, a software tool was not appropriate and manual coding was preferred. Additionally, at this intense level of analysis, errors are easier recognised when the coding is conducted manually and the outcomes are based on the holistic background of the content (Silverman, 1993).

The data analysis allowed conclusions and generalisations to be made regarding the Logistics City-Clusters concept, which are summarised as the preliminary model. Before these were finally developed, the set of words and the informal translation sheet

was revisited and adapted, literature was re-examined until clear trends, indicating answers for the research questions, could be extrapolated. The two unstructured interviews were of immense importance because these perspectives represent primary data from top level executive managers and therefore carried significant weight in the examination.

### **3.5.2 Methods applied in ‘Round II’**

The preliminary model was transformed into statements that were used to develop a semi-structured interview protocol for Round II. To judge and sharpen the clarity of the questions, a draft copy of the protocol was tested by selected experts. After refining the interview schedule the data was collected from an expert panel of twelve respondents through face-to-face interviews. The respective transcription and analysis, applying substantial and theoretical coding, led to the development of an elaborated Logistics City-Cluster framework that is grounded in the thinking, actions and experience of associated key informants associated. The next two paragraphs describe the details of the applied data collection and analysis methods, which guaranteed a valid and rigorous outcome for this iteration.

#### **3.5.2.1 Data Collection: Semi-structured face-to-face interviews**

Based on four core justifications, the Round II data collection applied individual semi-structured in-depth interviews. First, the approach allows the direct understanding of the way key informants view the concept through their experiences and knowledge towards their associated Logistics City-Cluster. Second, an in-depth interview motivates the involved experts to participate in the next round, reducing the risk of losing participants for the following iteration (Nevo & Chan, 2007). Third, it combine the strengths of structured and unstructured methods, which allows controlled feedback to all emerged topics and at the same time enables spontaneous rich and unique insight (Fontana & Frey, 2005; Mann, 1985). Fourth, it leaves space to judge and rate importance through subtle use of language, which allows an appreciation of consensus or divergence. Based on the developed sampling framework, individuals were purposefully chosen. The so called ‘Logistics Banana’<sup>10</sup>, the hotspot area of logistics activity in Europe, was the selected area from which two inland Logistic City-Clusters

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<sup>10</sup> It represents the areas that have the highest concentration of logistics activities in Europe due to the ideal location at the crossroads of consumer and productions zones. The area stretches from South England, through Benelux, the north of France and the western portion of Germany into north Italy and Spain. Due to the banana shape of these regions, it is referred as the European ‘Logistics Banana’.

and subsequently their industrial, government and academic stakeholders were chosen (Table 3.5-4).

**Table 3.5-4: Round II sampling: Inland Logistics City-Clusters**

Logistics City-Clusters		
Duisburg	Zaragoza	
(i) hosts the biggest inland waterway port in Europe (DuisPort)	(i) host the biggest 'Logistics Village' in Europe (Plaza Logistica)	
(ii) has sophisticated inland waterway, rail and road connectivity	(ii) has sophisticated aviation, rail and road transport connectivity	
(iii) linked to 'Fraunhofer Research Institute for Logistics' (leading research facility for logistics)	(iii) has a modern research facility that specialised in logistics (Zaragoza Logistics Centre, MIT).	
(iv) linked to the 'University of Dortmund and Duisburg' that provided logistics higher education and research	(iv) linked to the University of Zaragoza that provide specialised logistics higher education and research	
(v) host various regional and European logistics headquarters	(v) host various regional and European logistics headquarters	
Industry	Government	Academic
<b>Zaragoza</b> <b>Mr. Ricardo Garcia Becerril</b> CEO of Plaza Logistica in Zaragoza	<b>Duisburg</b> <b>Ms Bettina Kittel</b> Senior Legal Secretary from the State Government of North Rhein Westphalia	<b>Zaragoza</b> <b>Prof. Dr. Kraiselburd</b> Director of Zaragoza Logistics Centre / Vice President of 'Spanish Centre of Logistics'
<b>Duisburg</b> <b>Mr. Tobias Metten</b> DuisPort: Deputy Director and Head of Corporate Development of	Head of the Department for Trade, Services and Logistics German wide recognised expert on Logistics Clusters.	<b>Zaragoza</b> <b>Ms. Carolina Garcia Plante</b> Research Fellow at the Zaragoza Logistics Centre

To enable a balanced sampling, two coastal Logistics City-Clusters, namely Hamburg and Rotterdam, were also included. The industrial, government and academic stakeholders purposefully chosen from these two clusters are presented in Table 3.5-5.

**Table 3.5-5: Round II sampling: Coastal Logistics City-Clusters**

Logistics City-Clusters		
Hamburg	Rotterdam	
(i) host the second biggest seaport in Europe (container)	(i) host the biggest seaport in Europe (container and tons)	
(ii) has sophisticated rail and road connectivity as well as noticeable aviation and inland waterway infrastructure	(ii) has the most sophisticated inland waterway connectivity as well as very good rail and road connectivity	
(iii) host various European and World logistics headquarters	(iii) host various regional and European logistics headquarters	
(iv) initiated one of first truly operating governance system for logistics activities to actively develop their cluster	(iv) is linked to 'TNO' (Netherlands organisation for Applied Scientific Research) in Delft	
(v) hosts various universities that provide specialised logistics higher education and research	(v) hosts various Universities that provide specialised logistics higher education and research	
Industry	Government	Academic
<b>Rotterdam</b> <b>Mr. Rien Geurts</b> CEO of Geodis Logistics Benelux having over 30 years of experience in logistics	<b>Hamburg</b> <b>Mr. Martin von Ivernois</b> Executive position in the Hamburger Senate	<b>Rotterdam</b> <b>Dr. Pieter de Langen</b> Senior Research Fellow at the Erasmus University (now Professor in Eindhoven)
<b>Hamburg</b> <b>Mr. Guenther Dorigoni</b> Director of Chamber of Industry and Commerce in Hamburg Head of the Department for Transport Networks and Tourism	Head of the Department for Logistics, Shipping and Transport Economics / Senior Macro Economist	Head of the Corporate Development Department of the Seaport of Rotterdam World known expert on seaport clusters
<b>Hamburg</b> <b>Ms. Christine Beine</b> Deputy Director at Chamber of Industry and Commerce in Hamburg Head of the Department for Transport Infrastructure and Maritime Logistics	<b>Hamburg</b> <b>Mr. Ralf Fiedler</b> Executive of the Logistics Initiative of Hamburg (Cluster Governance) Director of the Logistics Cluster for the northern region of Hamburg Over 15 years of experience as a logistics consultant and scientist	<b>Rotterdam</b> <b>Dr. Bart Kuipers</b> Senior consult of TNO (Applied Scientific Research) Over 25 years of expertise is in transport and logistics as part of the TNO Senior Research Fellow at the Erasmus University

In total twelve stakeholders, which hold senior or executive positions, were interviewed because of their specific knowledge and influential power on decisions related to the future development pertaining to their Logistics City-Cluster. The distinct expertise of the respondents and the equal contribution of the specific groups enabled construction of a balanced framework integrating different perspectives. The managerial experts were asked for their permission to be interviewed and following their agreement, an official information package was forwarded in order to facilitate the respondents' prior thoughts and to expedite the interview process. This package (Appendix I) consisted of four sections, as presented in Table 3.5-6.

**Table 3.5-6: Content of the interview information package**

<p><b>Information to Participants:</b> explaining the objectives, the type of sampling, the use of the research data, the terms of confidentiality and associated risks</p> <p><b>Interview Guideline:</b> providing a list of the semi-structured questions</p> <p><b>Consent Form:</b> to be signed by the interviewees prior to the interview to attest to their official agreement of participation</p> <p><b>Research Ethics Statement:</b> explaining the requirements for the investigator to collect data and the rights of the participants</p>
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Prior to the interviews, a pilot test was conducted and analysed to ensure that the interview instrument was unambiguous, free from errors and to improve the quality of interview technique (Loeben & Sitter, 2002; Pitman & Maxwell, 1992). The interviews were audio taped and immediately transcribed. If requested by the interviewee, the transcribed interview was made available for correction or elaboration.

### **3.5.2.2 Data Analysing: Substantial and theoretical coding**

The analysis approach applied was the constant comparative method, which refers to the steady comparisons between the different transcripts, involving coding of the data and the identification of pertinent themes (Denscombe, 2003; Glaser, 1978). Coding was used to reduce the huge amount of interview data by creating thematic categories at a more abstract level. Hence, the responses of the first interview generated categories that include similar codes. Subsequently, the codes and emergent themes of other interviews were compared to build more solid categories and to define relationships between those.

The coding procedure that was applied refers to the substantial and theoretical coding of Glaser (1978). In the beginning of the analysis, substantial coding was utilized, which started with open coding procedure and was followed by selective coding (Noble,

2002). Open coding facilitates the first condensing of the interviews into smaller analytic elements by analysing the transcript line by line to identify incidents which were labelled with codes. Although Round I provided an indication of core elements, open coding was necessary to allow the identification of new categories. Selective coding was applied as soon as the basic core categories and sub categories were confidently identified in the open coding process (Goulding, 2002; Guthrie, 2000). Selective coding was then used to label incidents that relate to previously identified core categories and sub-categories. Three questions were asked constantly during the substantive coding process (Table 3.5-7). Finally, theoretical coding was applied to link the substantive codes to each other. Hence, the transformed data, appearing as categories identified during the substantive coding process, was consolidated by building relationships and creating a meaning (Martin & Turner, 1986). In this process, two questions were constantly asked (Table 3.5-7).

**Table 3.5-7: Coding process**

Substantive Coding Process		Theoretical Coding
Open Coding	Selective Coding	
(i) What is the data of this study? (ii) What category does this incident indicate? (iii) What is actually happening with the data?		(i) Do any common themes connect these incidents and codes together? (ii) If so, what is the theme they reflect?

The entire coding process was supported by the technique of ‘memoing’, which is used to record and generalise emerging categories and properties from a huge amount of data (Noble, 2002). Two types of memos were applied: (i) concept cards and (ii) theoretical memos (Martin & Turner, 1986). Concept cards were utilized during the stage of open coding and the first half of the selective coding to collect the main emerging ideas and categories without mixing the data from different interviews. Then in the later stage of the theoretical coding and when starting substantive coding, the concept cards were integrated into theoretical memos that combined similar codes and incidents, allowing the development of a holistic framework based on interconnected categories and properties (Glaser 1978).

The written presentation, the last stage of this Round II, was guided by the theoretical memos. The elaborated Logistics City-Cluster model was supported by quotes of the participants<sup>11</sup> and developed illustrations to avoid losing the richness of the data in the theoretical description. The elaborated framework was the foundation for the final

<sup>11</sup> The German quotes were translated by accredited interpreter Inke Sieloff / NAATI No. 61730: Appendix II

iteration of the Delphi study, in which the emergent categories, subcategories and their relationships are tested.

### **3.5.3 Methods applied in Round III**

The elaborated framework and its categories were transformed into statements that were tested for veracity by applying a scaling technique in a survey. The in-depth questionnaire used one voting dimensions to gauge approval or disapproval and was completed by a purposefully selected group of respondents. Prior to distribution of the questionnaire a pilot test was conducted to ensure its validity and technical reliability, minimising the risk of low return rates and falsified data. The collected responses were analysed using statistical descriptive techniques to achieve a quantitative summarization of the data set. The median was chosen to measure the central tendency of approval towards the model. Additionally the spread of the data was considered by applying the interquartile range (IQR) as a technique of statistical dispersion. The next two paragraphs describe the details of the data collection and analysis.

#### **3.5.3.1 Data Collection: Survey questionnaire**

The survey used in the Round III consisted of a list of questions based on the findings from the semi-structured interviews. It was structured by applying a Likert-type scaling technique to capture information on a range of phenomena providing a fixed response (Malhotra & Peterson, 2006; Bowling, 1997). Whilst the range of the Likert scale can vary, a recent empirical study found that using 5, 7 or 10 scales rating only had a small affect on the outcome (Dawes, 2008). As a result, it was decided to apply a seven point Likert type scale in this investigation. Additionally, to minimise the risk of losing the richness of potential responses and to assure additional considerations to be heard, a free text box at the end of each section was inserted (Beanland et al., 1999).

It was recognised that there are various voting dimensions that can be applied when using a Likert scale. Turoff (1979) identified four such dimensions which are: desirability, feasibility, importance and confidence. Turoff (1979) argues that application of one of these dimensions is necessary to obtain an adequate evaluation and stated that it is unwise to attempt to ask for a vote on more than two dimensions per statement. However, if a core statement has established various subsets, then further dimensions can be introduced (Ogden et al., 2005). Taking the aim of the study into

consideration, the development of a validated framework, it has been decided on one voting dimension for all statements (Table 3.5-8).

**Table 3.5-8: Likert-Scale voting dimension**

Scale of Confidence						
strongly approve	approve	somewhat approve	neutral	somewhat disapprove	disapprove	somewhat disapprove

The statements and the layout of the questionnaire are significant factors affecting the validity of the investigation (Boynton & Greenhalgh, 2004; Gillham, 2000). Empirical studies have shown that low response rates are often due to a lack of an appropriate font and its size, colour and spacing (Howitt & Cramer, 2000). In addition, it is essential that a questionnaire is developed to measure what it is meant to ask to achieve an appropriate outcome (Boynton & Greenhalgh, 2004). Therefore, the statements presented to the respondents must be understandable for the reader to facilitate an accurate representation of their perception (Schaeffer, 1991).

In this respect, the questionnaire (Appendix III) was preceded by an unambiguous title, an introductory letter, and an information sheet to ensure that the respondent was clear about the kind of information required. Further, each statement was checked regarding the research objectives, ambiguity and definitions. Most importantly, once the questionnaire was entirely developed, it was pilot tested in regards to four core aspects by two external experts. First was the technical test associated with the software to achieve a convenient handling for the respondents and fast transition of the data. Secondly, the content was tested in regards of complexity, coherency, use of language and a possible introduction of the categories and sub-categories. As a result of the feedback, the complexity was reduced and the language use simplified, due to the international participants of the study. Third, the layout, including figures, colouring and font size, was critically reviewed and resulted in minor changes. The last item tested was the time needed for the participants to complete the in-depth survey. As a result, the time needed by non-native English speakers was estimated to be around two and a half hours. Therefore, it was decided to divide the survey into two separate parts, which were sent out two weeks apart.

Based on the developed sampling framework, the survey was directly sent to 44 respondents (e.g. CEOs, Directors, Professors, Senior Researcher, Senior Legal Secretaries and Executive Strategic Planners), incorporating the 14 participants of

Round I and II. The core geographical regions and Logistics City-Clusters that were considered are:

- **Europe:** Hamburg, Rotterdam, Zaragoza and Duisburg
- **Asia Pacific:** Shanghai, Melbourne, Singapore, and Beijing

Within a period of two month, 33 responses were received, resulting in a general response rate of 75%. The response rate of the participants involved in the first two iterations was 78.57%. Both the number of participants and the response rates are satisfying for the applied methodology.

Regarding the geographical ratio, approximately 57% of the received responses are associated with European Logistics City-Clusters and 43% with the Asia Pacific region, including one response of Dubai due to the participation in Round I. The sizes of the received responses and the years of experience in the particular sector and logistics are indicated in Table 3.5-9. Although it seems that the ratio between coastal and inland location is unbalanced, it is representative of the fact that most global trade and logistics areas are located coastal and that major inland logistics cluster are relatively recent (Van der Lugt & De Langen, 2005; Wood et al., 2002).

**Table 3.5-9: Round III sampling**

Geographical Location					
Coastal Logistics Cities			Inland Logistics Cities		
Sample Size:			Sample Size:		
23			10		
Strategic Stakeholder					
Industry		Government		Academic	
Sample Size:		Sample Size:		Sample Size:	
12		9		12	
Years in industry (mean per person):		Years in government (mean per person):		Years in industry (mean per person):	
13.91		10.88		15.75	
Years in logistics (mean per person):		Years in logistics (mean per person):		Years in logistics (mean per person):	
13.91		8.44		14.92	

### 3.5.3.2 Data Analysis: Descriptive statistics

In Delphi studies applying the Likert Scale, descriptive statistics with a focus on the measures of central tendency and the level of dispersion are appropriate techniques to analyse the gathered data (e.g. Hsu & Sandford, 2007; Hasson et al., 2000). The mean and median are the common ways of measuring the tendency of a group, whereas the dispersion of responses is measured in terms of standard deviation or IQR. Although all of these techniques have been applied in previous Delphi studies (e.g. Ogden et al. 2005; McKinnen & Forster, 2000), it is argued that the mean and the standard deviation

are inappropriate measures when using an ordinal likert-scale (Blaikie, 2003; Jamieson, 2004). This is critical, since the mean and standard deviation need to be based upon equal interval variables (Clegg, 1998). However, the intervals between the categories in ordinal scales can not be assumed to be the same, although the response categories have an inherent order. For example, the difference in a respondent's perception between 'approving' and 'strongly approve' may not be the same as for 'approving' and being 'neutral'. For ordinal data that involves non-equal intervals, as it is for this investigation, the median and IQR are the appropriate descriptive techniques (Kuzon et al., 1996). The median is the middle value of a data set that represents a central tendency, whilst the IQR is the difference between the upper and the lower quartiles of a data set, indicating its spread. Consequently, the IQR it is the middle 50% of the data set that eliminates the influence of outliers by removing the bottom 25% and top 25% of the distribution. Whilst there are various techniques to calculate the IQR, in this study the linear interpolation of Freud and Perles (1987) is applied.

Analysis and interpretation of this data using the descriptive statistical techniques provides information on the confidence dimension of the categories and their properties. The numerical findings are presented in boxplots, which commonly represent five-number summaries integrated in the box and the whiskers. The box includes the range of scores indicating three data measures, the upper quartile, median and lower quartile. The whiskers, lines extended to the minimum and maximum scores in the distribution, define further two data measures that are the upper and lower fences. However, boxplots can also indicate a degree of skewness in the data.

The numerical outcomes are interpreted and the most important aspects are presented in a text format. Using a quantitative approach for this iteration allowed a clear identification of commonalities and differences among the participants that could be used to consolidate a validated framework and allowed the drawing of clear implications for the development of Logistics City-Clusters.

### **3.6 Concluding the strengths and weaknesses of the research design**

The main strength of the chosen research design is that it enables exploration and unforced consensus or dispersion in a particular area that lacks empirical evidence. This methodology is flexible enough to be applied in different fields and a wide range of

problems for which there is often no other suitable means. Exploration is facilitated by an expert panel that is intimately involved in the area of investigation, and it is this focus that underpins the richness and validity of the outcome. In addition, the anonymity of the respondents enables the experts to freely express their knowledge, opinions and perceptions.

The iterative process allows the experts to reconsider their perceptions and judgements in the light of controlled feedback. This provides more time for the experts to think through their ideas before a final commitment and enables the generation of further insight and clarifications. Also critical, this approach permits simple and sophisticated quantitative means for analysing the investigation to summarise and support the rich qualitative outcome. One final advantage is that the multiple analyses, applied in different stages, ensures that the knowledge and perceptions of the participants are well represented and allows a final adequate summarisation.

One of the shortcomings commonly associated with the Delphi technique is that it generates a series of general statements instead of in-depth knowledge (Altschuld & Thomas, 1991). This is based on the fact that the knowledge of each participating expert is not evenly spread and the questionnaires cannot adequately manage such wide-ranging knowledge. However, this shortcoming does not fully apply to this study, since the modified Delphi methodology includes an in-depth data collection that provides a rich description of the generated statements tested in the questionnaire.

Whilst more iteration warrant better and more defined outcomes (Cunliffe, 2002), the sum of collection of data, its analysis and the feedback preparation can be very time consuming and laborious (Hsu & Sandford, 2007; Williams & Webb, 1994). Certainly, the three iteration of this study, especially the face-to-face in-depth interviews and their analysis, tented to be quite time consuming. Nevertheless, good structure and planning of this investigation, as well as the dedication of the senior executive expert panel, have reduced the risk of unnecessary idle time.

Witkin and Altschuld (1995) also argued that there is a potential for response rate to decrease as more iterations are conducted. The iterative approach tends to be vulnerable to attrition of the expert panels due to disillusionment with the process, increasing boredom, and lack of time (Woudenberg, 1991). Hence, motivation is a crucial factor for a successful Delphi study and was ensured in this study by contacting

participants personally via interviews which led to a satisfactory participation rate in the final iteration.

Williams and Webb (1994) indicate that the investigator interpretation of the data and its feedback to the expert might distort the outcomes. This especially applies when concepts arise from the data, rather than being imposed by a pre-determined hypothesis. Bias, however, is generally recognised in qualitative methods, since the investigator is intimately involved in the process of data collection and analysis. Therefore valid research requires that the investigator recognises the sources of bias that are associated with culture, gender, education, training, experience and personal inclination (Tuck, 2007). To reduce the risk that the data is forced to fit ready-made ideas, the possible sources of the investigator's bias was examined before commencing the study and was regularly reflected on during the process.

The next chapter will explicitly present the results of Round I. The preliminary Logistics City-Cluster framework will be discussed, based on the re-interrogation of relevant literature and the unstructured two initial interviews with executive experts.

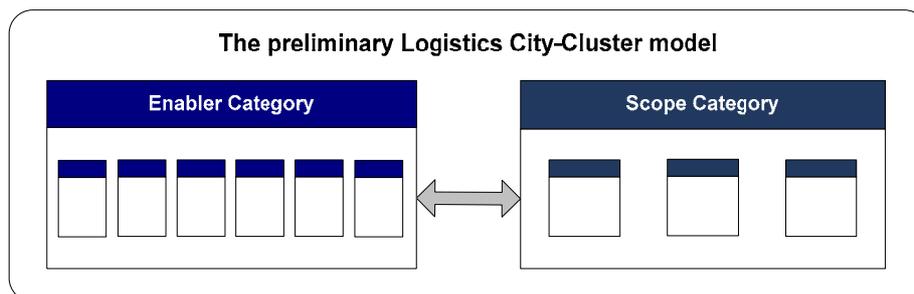
# Chapter 4

## Delphi Round I: Establishing the preliminary Logistics City-Cluster framework

### 4.1 The preliminary Logistics City-Cluster framework

To enable a first consensual understanding of the Logistics City-Cluster concept, a preliminary framework was developed. This initial model was firstly based on the review of literature regarding: (i) logistics nodes progression, (ii) cluster theories and the (iii) 'Triple Bottom Line' framework. Secondly, this was complemented by two unstructured interviews with executive participants from 'Dubai' and 'Singapore'.

It was identified that the overall 'Scope' of the concept is to be a sustainable global integrated logistics node located either inland or on the coast. This implies that regional economic growth generated by Logistics City-Clusters integrates social and environmental values. In order to achieve this scope there must be a strong foundation, which is referred in the preliminary model as the 'Enabler'. These enablers are critical determinants and the strategic foundation for the development of Logistics City-Clusters, and without these elements and their alignment, the growth of this concept is hindered. Consequently, the preliminary model consisted of two core elements, namely the '**Enabler**' and '**Scope**' category (Figure 4.1-1).



**Figure 4.1-1: The preliminary Logistics City-Cluster framework**

The following paragraphs will discuss these two core categories by reflecting upon the literature and the interviews. First the enabling concept and its six sub-categories will be examined, which is then followed by a discussion of the scope category and its three components. The chapter ends with comments on the preliminary model and introduces the semi-structured question used in 'Round II'.

## 4.2 The preliminary ‘Enabler’ category

Although the concept is still used very loosely, Logistics City-Clusters are perceived as a critical approach to address the challenges of globalisation and increasing complexity of trade. To establish a fundamental understanding of such a strategic design, the determinants and characteristics of this logistics-driven system must be carefully established. In this regard, six initial enabling subcategories were identified: **infrastructure**, **services**, **skilled workforce**, **proximate demand**, **stakeholders** and **governance / policy** (Figure 4.2-1). These are elaborated and justified separately in the next paragraphs, and are then integrated under the banner of the overall ‘Enabler’ category. This final reflection includes a discussion on factors influencing the enabling system.

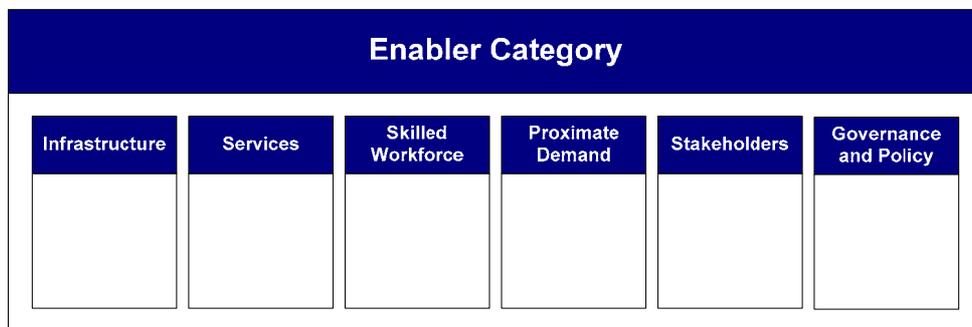


Figure 4.2-1: The core elements of the initial ‘Enabler’ category

### 4.2.1 Infrastructure

Whilst the logistics node review identified physical infrastructure as a crucial enabling element there is, however, a debate about the breadth and specification of functions that the physical infrastructure should embody. The core focus is upon a relatively minimalist view of infrastructure, defining it as basic structures facilitating the flow of goods and services between buyers and sellers (AGD, 2008). Hence, international gateways such as seaports, airports and inland ports, including their logistics facilities, are an essential element for participation in the global and regional distribution arena (e.g. ESCAP, 2009; Notteboom & Rodrigue, 2009; Rimiene & Grundy, 2007; Van der Lugt & De Langen, 2005). In addition, efficient connectivity to and from gateways is essential. Consequently, transport infrastructure is also a significant element (e.g. Roso et al., 2009; Cumming & Elzer, 2007; ILSCM, 2007a; Capineri & Leinbach, 2006). The transport connectivity must be tailored towards the particular gateway and is a critical factor for logistics operators when choosing a location (Hong & Chin, 2007; Oum & Park, 2004). Thus, it is not surprising that many regions emphasize their investments in the provision of these hardware facilities, as indicated by the two interviewees.

Certainly, Dubai and Singapore have benefited from massive and concentrated infrastructure developments, which facilitate cluster development (Ashai et al., 2007; WGL, 2002). Interestingly, the direct notion of this physical infrastructure is not of particular importance when reflecting cluster theories, although Porter (1990) includes physical infrastructure in his categories of factor conditions.

It was found that others have complex views on physical infrastructure that encompass social and commercial capital (Clough et al., 2004; Rutherford, 2002). It was decided to adopt this dual perception, since there was a broad agreement at the Logistics City-Cluster level in both the literature and interviews (e.g. Nagel et al., 2009a; Walter & Eiermann, 2008; Viswanadham & Gaonkar, 2003). Hence, social infrastructure and commercial infrastructure districts need to be integrated since it is argued that these will ensure innovation, appropriate educated workforce and supporting economic activities that enable efficient operations of the logistics system (e.g. MIT, 2009; Ma & Huang, 2008; Groznik, 2008; Hong & Chin, 2007). Indeed, this notion is a key aspect of cluster theories. First, it partly aligns with the underlying processes of *'Innovation and Knowledge Spillovers'* by providing the physical components that enable research and education (e.g. Engelstoft et al., 2006; Audretsch & Lehmann, 2006; Fujita & Mori, 2005). Second, it integrates the theoretical aspect *'Social Embeddedness and Supportive Institutions'*, asserting that a cluster is a social-economic system (e.g. Vorley, 2008; Becattini, 2004; Paniccina, 2002).

Further, it was observed that transport and gateway infrastructure alone do not mean competent connectivity, and they must be complemented with efficient information flow (e.g. Roso et al., 2009; Nagel, et al., 2009a; Srour et al., 2008; Labanauskas & Palsaitis, 2007), suggesting that ICT infrastructure are essential components of any Logistics City-Cluster. For instance, ICT was identified as one of the factors forcing the evolution of logistics nodes, and ILSCM (2007b) in particular argued that the application of intelligent transport system technology can increase logistics infrastructure capacity. This was also in the focus of the Singaporean interviewee when he asserted that a separation between the physical-hard infrastructure and the virtual-soft component is beneficial. Additionally, the interviewee pointed out that Singapore is currently up-grading the soft-component by developing an integrated trade information platform enabling a seamless information transfer (ICT-WG, 2002).

A final element that was identified is referred to as the financial infrastructure. It is asserted that financial stability is necessary for any logistics node development (e.g.

Van Dam et al., 2007; Tsamboulas & Kapros, 2003). This argument is based on the increasing cost for infrastructure development induced by large transport volumes and the associated pressure for upgrading existing systems. Hence, having access to capital will not only enable appropriate physical infrastructure in general but it also supports companies to improve productivity and provide growth opportunities (e.g. Ma & Huang, 2008; Hanusch & Pyka, 2007b; Porter, 1990). This sub-element links to the theoretical stance of *'Investment Conditions'* identified in the review of cluster theories. Indeed, favourable and tailored financial infrastructure conditions for the logistics industry allow 'Neo-Schumpeterian' innovation dynamics which enable growth of the cluster. Financial support and stability was especially emphasised by the Dubai participant, when he argued that massive infrastructure development was only possible due to the appropriate long term financial support.

Thus, the infrastructure enabler integrates three major sub-elements (Figure 4.2-2). First, **physical infrastructure** that is further segmented into: (i) *international gateways*, (ii) *transport*, (iii) *commercial* and (iv) *social infrastructure*. Second is the **information infrastructure** that integrates the physical component of (i) *hardware* and the virtual component of (ii) *software and frameworks*. The third element is the **financial infrastructure** that supports all aspects of the development associated with a Logistics City-Cluster.

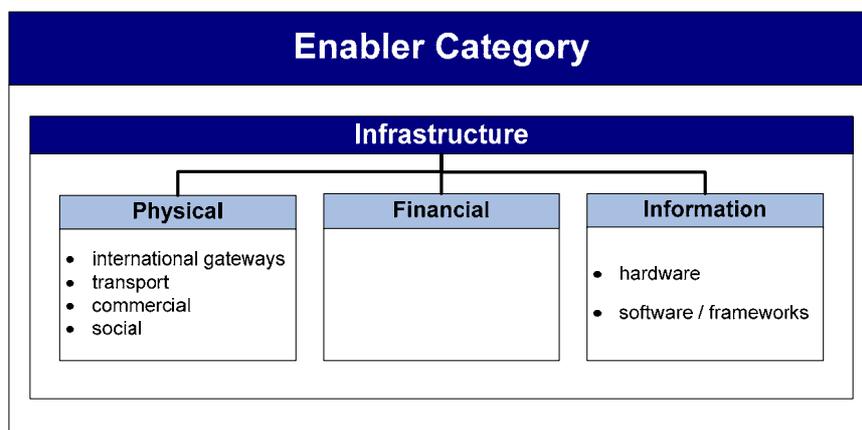


Figure 4.2-2: The preliminary 'Infrastructure' enabler

## 4.2.2 Services

The core notion of the service category is logistics activities. These activities relate directly to the value-add factor by facilitating connectivity to and from distant markets. In the logistics industry, these include terminal operation, transportation and storage (e.g. Notteboom & Rodrigue, 2009; Meidute, 2007; Hesse & Rodrigue, 2004).

However, it was obvious that there are additional value-add logistics activities such as light assembly, customizing, or packaging and supply chain management (e.g. Nagel et al., 2009b; Roso et al., 2009; Rimiene & Grundey, 2007; Tsamboulas, 2005). Linking these to cluster theories, this appears as the element of '*Supplier Specialisation and Value Chains*'; illustrating that logistics companies cluster because of increasing returns (e.g. cost reduction, joint problem solving) that result from having similar companies in the same sector (e.g. Ketels & Memedovic, 2008; Audretsch & Lehmann, 2006; Krugman, 1995; Porter, 1990).

Further, it was observed that value-add business services, such as banking and insurance, create potential advantages for the logistics industry. Moreover, it is argued that these services are a key component for the existence and growth of any sophisticated logistics node progression (e.g. Nagel, 2009c; Capineri & Leinbach, 2006; Meyrick, 2006; Walter & Poist, 2003). Thus, '*Economic Diversification*', a determinant of cluster theories, is likely to play a significant role for logistics agglomeration (e.g. Mukkala, 2004; Capello, 2002; Harrington & Warf, 1995). Indeed, it is known that 'Logistics Villages', a bounded nucleus of Logistics City-Clusters, integrate a mix of unlike companies to achieve production advantages by sharing specialised services, common utilities and infrastructure.

The final element of this enabler is social services. It was claimed that these are an essential element of higher logistics node progressions since they are associated with the community and the concentration of economic activities (e.g. Nagel et al., 2009a; Groznik, 2008; Hong & Chin, 2007). From the perspective of cluster theories, this relates to the notion of '*Social Embeddedness and Supportive Institutions*' (e.g. Andersson et al., 2004; Scott, 2004; Cooke, 2001). Reinforcing the literature review, the two interviewees posited that social services are essential, and linked this topic to the attraction of the workforce required to operate the logistics and business services.

Based on these findings it is concluded that the service enabler integrates three major sub-segments; (i) **logistics**, (ii) **value-add business** and (iii) **social** services (Figure 4.2-3). This enabler is of great importance since the agglomeration benefits arise from the existence of many logistics providers and value-add business activities.

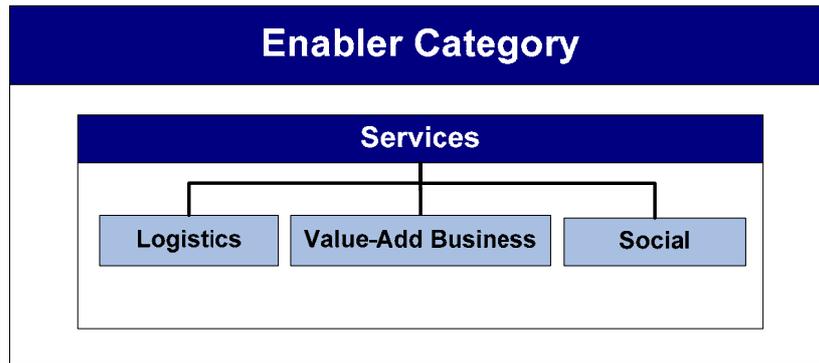


Figure 4.2-3: The preliminary 'Service' enabler

### 4.2.3 Skilled workforce

In various publications, the availability of a skilled workforce during the development of Logistics City-Clusters appears as an important element. It is argued that skilled labour will promote unity for the referent services (e.g. Ma & Huang, 2008; Gao, 2005; Notteboom & Rodrigue, 2005). Clearly, this initial enabler links to the theoretical cluster aspect of 'Labour Market Pooling' and 'Innovation and Knowledge Spillovers'. First, accessibility to a large skilled labour pool attracts companies by enabling low hiring / firing cost, increased productivity and knowledge spillovers (e.g. O'Leary, 2007; Engelstoff et al., 2006; Baptista & Swann, 2000; Paniccia, 1999). Secondly, a critical mass of logistics companies reduces costs for specialised education and training (e.g. Vorley, 2008; De Langen, 2004; Markusen, 1996). In this context, it was found that the quality and the size of the workforce and their level of education is a critical determinant for logistics operators to settle in a region (Ma & Huang, 2008; Hong & Chin, 2007; Oum & Park, 2004).

This enabler is referred to as the **skilled workforce** (Figure 4.2-4). Skilled workforce for the logistics sector must be available in a critical mass, in order to achieve innovation and increased productivity, which ultimately leads to the enhancement of the competitive advantage. This category also links to education and social infrastructure.

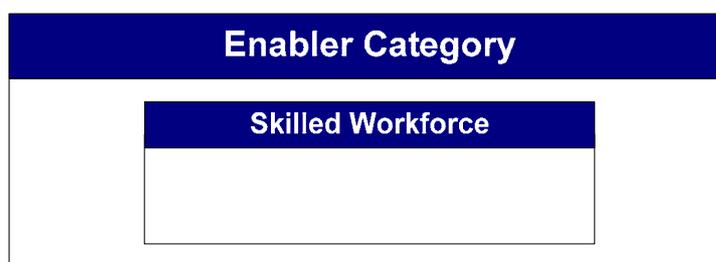


Figure 4.2-4: The preliminary 'Skilled Workforce' enabler

#### 4.2.4 Proximate demand

It was found that the geo-strategic concern of close proximity to demand for logistics activities is essential (e.g. Notteboom & Rodrigue, 2009; Ma & Huang, 2008; Nathanail, 2007; van Dam et al., 2007), implying that '*Local Demand*' plays an important role. As Porter (1990) indicated sophisticated local demand creates benefits and attracts further companies due to economy of scale. Without a proximate critical market size, there will be no investment in logistics development (Hong & Chin, 2007; Oum & Park, 2004). In this context, it emerged that gateways and transport infrastructure need to be based on sufficient demand to justify investment cost and mass scale operation (e.g. Roso et al., 2009; Racunica & Wynter, 2005; Jun, 2004). This was also emphasised by the interviewee from Dubai, who indicated that proximate demand played an important role for the development of the logistics hub functionality, which was further boosted through the development of 'Dubai Industrial City'. Despite this strong focus on proximate demand, there was also a hint in the literature and by the Singaporean interviewee that gateways need to link with distant markets (e.g. Wang et al., 2007; CER, 2007; Labanauskas & Palsaitis, 2007).

Consequently, proximate demand is of critical importance, since the larger the **industrial** and **service** market size, the stronger is the effect of attraction or logistics activities, which increases the success of a Logistics City-Cluster (Figure 4.2-5).

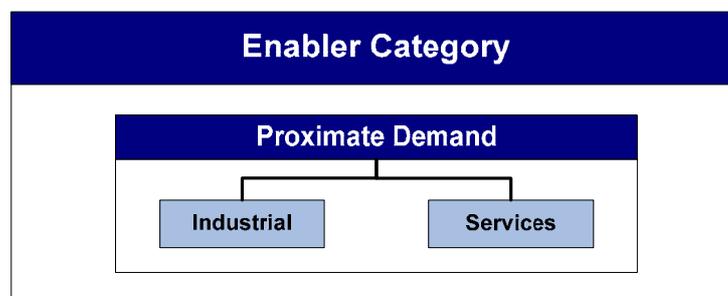


Figure 4.2-5: The preliminary 'Proximate Demand' enabler

#### 4.2.5 Stakeholders

In the review, it was observed that logistics agglomeration involves three core stakeholder groups. Wang et al. (2007) identified the enterprise agent (logistics companies), social management agent (government) and the environment agent (community), when developing a logistics agglomeration simulation model. The enterprise agent was further supported in the literature and commonly discussed as the private stakeholder group that includes such as terminal and warehouse operators, supply chain providers, transport insurances, manufactures and retail companies (e.g.

van Dam et al., 2007; Nathanail, 2007; Meidute, 2005; Hesse & Rodrigue, 2004). Additionally, numerous scholars confirm the government and community stakeholder groups, since these are affected by or influence the logistics-driven system (e.g. Nagel et al., 2009a; Meidute, 2007; EEIG, 2004). For instance, the public domain's interest is in the resulting socio-economic benefits or negative environmental effects. Important here is that the various stakeholders have different interests and objectives. In this context, it is argued that cooperation and alignment of the stakeholder groups could increase efficiency within a logistics system (Grozniak, 2008; Rodrigue, 2008).

Based on this observation the stakeholder enabler integrates three major sub-segments (Figure 4.2-6): the **industry and commerce** sector, the **governmental** stakeholder group and the **public community**.

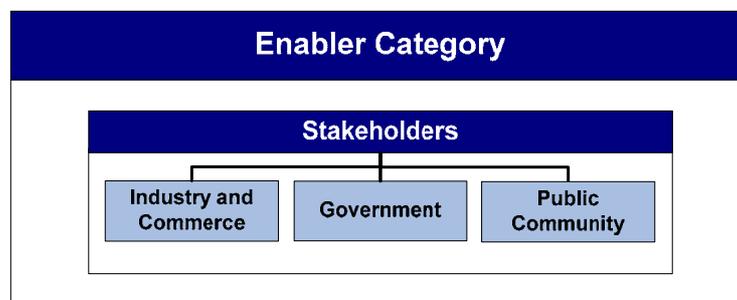


Figure 4.2-6: The preliminary 'Stakeholders' enabler

#### 4.2.6 Governance and policy

It appeared that the higher the logistics node progression, the more governance and policy plays a stabilising role. Due to the complexity of Logistics City-Clusters and because of their stakeholders' different aims, it is essential to co-ordinate efforts to promote and develop as a system. This links into the theoretical cluster perspective of *'Balance of Cooperation and Rivalry'*. Cooperation is favourable for a cluster development, since combined support in shared areas will lead to increased returns (e.g. Grozniak, 2008; Asheim et al., 2006; Becattini, 2004). For example, pure investment in infrastructure does not guarantee efficient utilisation; it requires alignment with information systems to ensure better coordination and operation (ICT-WG, 2002). The importance of governance was also suggested by the interviewee from Singapore. He argued that negative effects of a non-holistic approach are mitigated by a 'Champion Agency' that bridges all relevant stakeholders in the area of logistics. Its primary work is to coordinate and develop the logistics industry in a systematic way by identifying common needs, the removal of impediments and the alignment of regulations.

Indeed, government policies play an important role for the logistics industry, since if particular sectors or strategies are favoured by legislation; they are more likely to succeed (Nagel et al., 2009a; Van Dam et al., 2007; Oum & Park, 2004). For instance, it was found that within all investigated Logistics City-Clusters, favourable administrative regional legislation (e.g. tailored capital or innovation policies) lowered entry barriers by being an attractive location and raised perceived exit barriers (e.g. MIT, 2009; Daza, 2009; Walter & Eiermann, 2008). Consequently, the theoretical notions of clusters ‘*Entry and Exit Barriers*’ and ‘*Firm Strategy*’ need to be considered. Since trade facilitation due to physical hubs is one of the basic elements of Logistics City-Clusters, it was not surprising that governments have focused on policies that enable trade liberalization through agreements or FTZ (DWC, 2010; Walter & Eiermann 2008; Lingang Group, 2006). This was also of great importance to the interviewee from Dubai; when he argued that one major component is the single custom-bonded free zone that integrates dispersed transshipment hubs by specifically designed ‘FTZ Transport Corridors’.

Hence, the initial ‘Governance and Policy’ enabler (Figure 4.2-7) integrates two core sub-segments. First is favourable **legislation**, covering the notion of (i) *entry* and (ii) *exit barriers*. Second the element of **trade facilitation**, including (i) *FTZ* and (ii) *liberal trade agreements*.

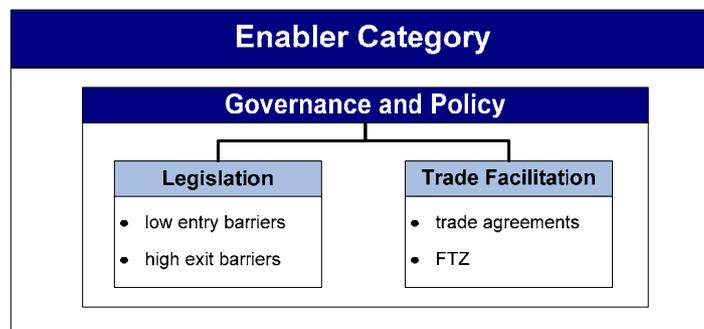
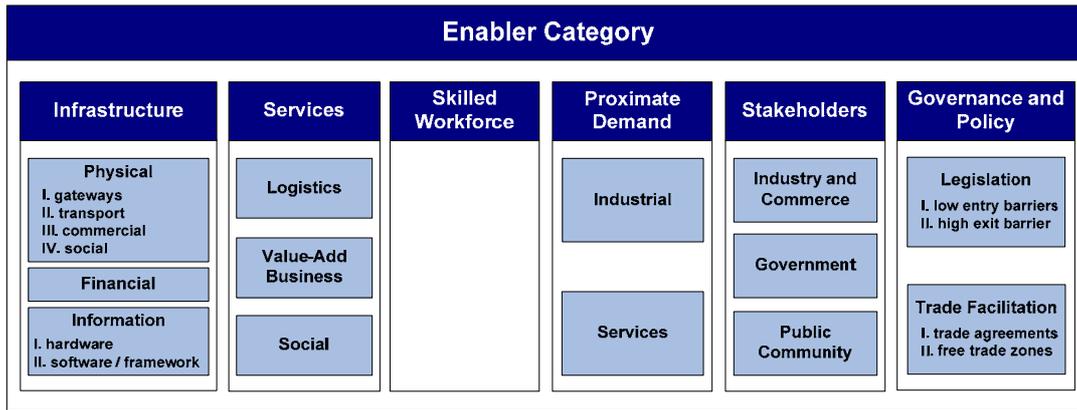


Figure 4.2-7: The preliminary ‘Governance and Policy’ enabler

#### 4.2.7 An overview of the ‘Enabler’ category

Each of these six preliminary parameters and their properties have relevance in the development and conduct of Logistics City-Clusters. The brief discussions have shown that the concept under review is a set of complex interacting tangible and intangible elements that cannot be understood in an individualistic manner, but instead need to be seen as an integrated system (Figure 4.2-8).



**Figure 4.2-8: The integrated 'Enabler' category of the preliminary framework**

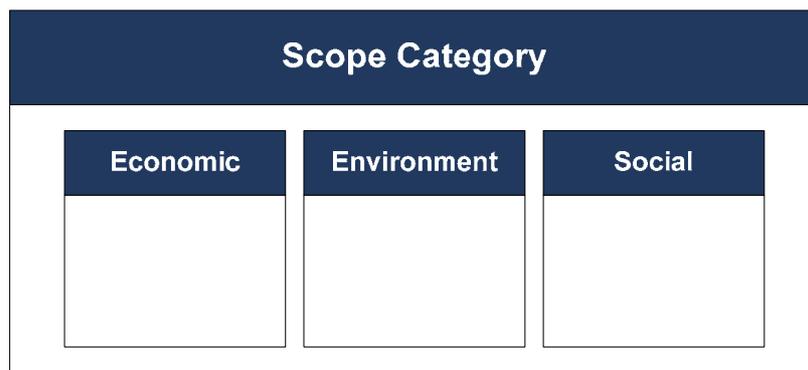
Whilst these components are critical for development, there are factors that influence the enabling elements. First, it was emphasised that the political influence has a strong effect on the enabling elements, which is indicated in the 'Governance and Policy' enabler. Both interviewees stated that without the governmental determination and support the logistics development would not have been as successful. This was mainly associated with the development of logistics infrastructure, but was also linked to favour legislation for the logistics operators in form of friendly tax policies and FTZ. The focus on infrastructure developments by governments has also been argued in many publications (e.g. Nagel et al., 2009a; Walter & Eiermann, 2008; Ashai et al., 2007). Interestingly, Wang et al. (2007), based on their multi agent simulation model, found that the natural evolution of logistics clustering is slow and that regional planning of logistics sites and transport infrastructure by governments will accelerate agglomeration. Also government influence on intangible elements are discussed in the literature and include the implementation of a virtual information platform (ICT-WG, 2002), support of logistics operators (Grozniak, 2008; Van Dam et al., 2007; Wang, 2004) or investment into logistics research and higher education (Nagel et al., 2009b; MIT, 2009).

Secondly, it appeared that geography has an influence on various enabling elements. It was argued that geographical conditions shape the particular character of logistics nodes (e.g. ESCAP, 2009; Capineri & Leinbach, 2006; Tsamboulas, 2005); a navigable river for instance will influence the grouping of infrastructure towards an inland waterway port and its services. However, there is also a geo-strategic factor that is associated with the notion of a favourable location regarding its proximity to freight generators (Labanauskas & Palsaitis, 2007; Nathanail, 2007; Tsamboulas & Kapros, 2003). The decision to focus on a logistics-driven system in Shenzhen, as discussed in the literature review, was based on the strategic geographical position of the massive

manufacturing complex in the “Pearl River Delta” region (Shenzhen Government, 2007). Indeed, both interviewees stated that the geographical location of Dubai and Singapore enabled strategic access to demand as a hub location and this was a facilitator of their logistics cluster development.

### 4.3 The preliminary ‘Scope’ category

It was noted that the overriding ‘scope’ of the Logistics City-Cluster concept is to be a *sustainable global integrated logistics node*. As discussed earlier, this notion supersedes the economic rationalist view based upon expanding economic value as the single indicator of success. Thus, the extent of regional economic growth generated by the Logistics City-Clusters must be concomitant with social and environmental requirements. These three dimensions of sustainability, namely ‘**Economic**’, ‘**Environmental**’ and ‘**Social**’, are the major elements that define the ‘Scope’ category (Figure 4.3-1).



**Figure 4.3-1: The core elements of the ‘Scope’ category**

In the next paragraphs these three components will be discussed by comparing the dimensions of the sustainability, highlighted in the literature review, with existing logistics publications and the two un-structured interviews. The ‘Scope’ category and their final categories and sub-segments will then be presented.

#### 4.3.1 Economic dimension

The focus of the logistics literature and the two initial interviews is on *economic regional growth indicated by the GDP*. It is argued that the logistics sector and the associated trade efficiencies enable additional economic growth potential of the entire region (e.g. ESCAP, 2009; Browne et al., 2007; Notteboom & Rodrigue, 2005; Rondinelli & Berry, 2000). Also, *employment* growth was strongly supported by both literature and the two interviewees. It was asserted that a Logistics City-Cluster creates

job opportunities particularly in the field of freight handling and light assembly (e.g. Belotserkovskiy et al., 2009; ESCAP, 2009; ILSCM, 2007b; Chang & Canode, 2003).

Although possible *income for governments and workforce* is debated in the literature, it is not on such an intense level (e.g. Walter & Eiermann, 2008; Ashai et al., 2007; BTE, 2000; Montalvo, 1998). However, it was an important topic for the representative from Dubai Logistics City, who argued that this development is driven by Dubai's ruler to diversify their country's economic foundation and enabling future income, since natural resource will deplete. Regarding the notion of innovation, comments suggested that a concentration of logistics activities is a focal point which allows knowledge spillovers and forces innovation due to competition, ultimately strengthening the economic development in a region (e.g. ESCAP, 2009; Groznik, 2008; Viswanadham & Gaonkar, 2003).

Thus, the economic dimension includes four major components that are (i) **growth of GDP**, (ii) **employment opportunities**, (iii) **generation of income** for governments and workforce and (iv) **increased innovation** (Figure 4.3-2).

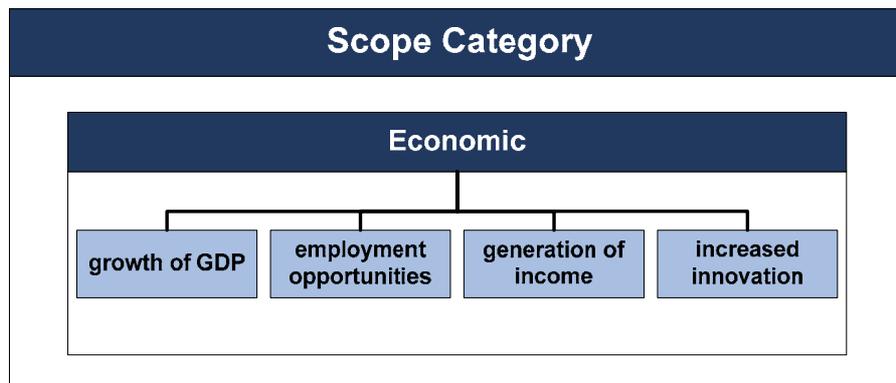


Figure 4.3-2: The preliminary 'Economic' scope category

### 4.3.2 Environmental dimension

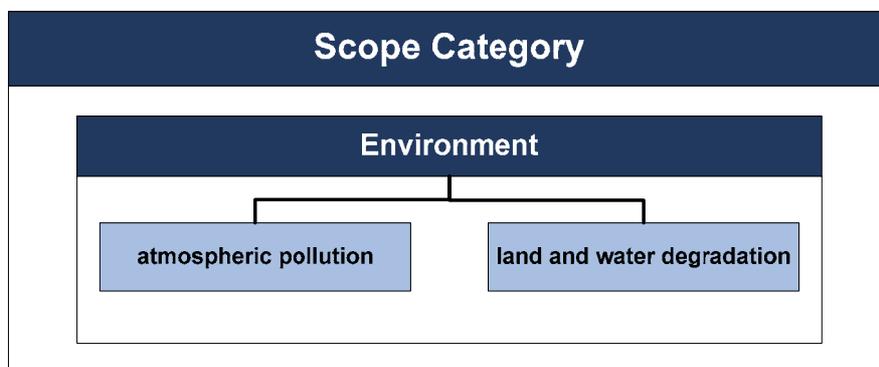
When examining the environmental dimension it was found that the topic of *air pollution* was the most discussed topic. One of the major sources of emission is transportation, a critical element of a Logistics City-Cluster, (e.g. Geroliminis & Daganzo, 2005; Ding & Liu, 2003; Ang-Olson & Cowart, 2002) and the fact that transport volumes are growing faster than GDP is exacerbating this negative effect (Aronsson & Brodin, 2006).

It was further found that the logistics industry and its associated facilities contribute to *destruction of natural land and water habitats* (e.g. Browne, et al., 2007; Hensher &

Button, 2003; Rodrigue et al., 2001). It is the transport sector with its associated hubs which is again perceived as the core polluting factor (e.g. Aronsson & Brodin, 2006; Robinson & Mortimer, 2004; Murphy & Poist, 2003). For instance, maritime driven logistics activities pollute coastal areas and cause distress to the maritime eco-system (Bramely & Power, 2009; Ding & Liu, 2003). This was also explicitly expressed by the participant from Singapore, which hosts the biggest seaport hub in the world.

The effect of logistics on the environment is generally perceived as negative and currently, the reduction of environmental effects is being tackled mainly by the introduction of new technologies and reengineered business processes (e.g. Browne, et al., 2007; Aronsson & Brodin, 2006; Geroliminis & Daganzo, 2005). Consequently, it was not surprising that both interviewees agreed that there is an increased focus on environmental issues, stating that no company or employees would consider locating or living in a polluted area. Whilst there is nowadays a stronger focus on ‘Green Logistics’, the conflict with the economic dimension and its focus on the increase of efficiencies and profits is obvious (e.g. Geroliminis & Daganzo, 2005; Taniguchi et al., 2004; Murphy & Poist, 2000). Rodrigue et al. (2001) have labelled this as the ‘paradox of Green Logistics’.

Interestingly, the *preservation of biodiversity* and *behaviour of consumption* component could not be directly linked to the topic of logistics activities. It seems that this notion relates to a higher level of agglomeration that combines a number activities, thus it is hard to be linked to one particular sector. Consequently, the environmental dimension has two core aspects: (i) **atmospheric pollution** and (ii) **land and water degradation** (Figure 4.3-3). However, effects on the air, land and water hold a potential threat for biodiversity as argued in the interviews and hinted at in the literature (Sathaye et al., 2006; Geroliminis & Daganzo, 2005).



**Figure 4.3-3: The preliminary ‘Environmental’ scope category**

### 4.3.3 Social dimension

Regarding the social aspect, there was no clear and direct publication associated with the logistics sector. However, various publications addressed the hazardous consequences for *well-being* or health due to pollution caused by the logistics sector (e.g. Browne et al., 2007; Rondinelli & Berry, 2000; Geroliminis & Daganzo, 2005). Further, it was concluded that logistics, in particular transport activities, reduce *quality of life* by creating noise, degrading natural habitats in urban areas, causing accidents and traffic congestions (e.g. Browne et al., 2007; Aronsson & Brodin, 2006; Ding & Liu, 2003). At the same time it was hinted, especially by both interviewees, that quality of life is increasing due to the employment possibilities, which relates to material well-being (Cuthill, 2009; Boschken, 2008; Aronsson & Brodin, 2006; Alderson & Beckfield, 2007).

The topic of *social infrastructure* was not widely debated in the logistics literature. However, few scholars have associated social infrastructure as an important part of port clusters (e.g. Ashai et al., 2007; Rutherford, 2002; BTE, 2000). Additionally, the interviewees asserted that there was a strong linkage between the development of social infrastructure and the logistics sector, which employs a major part of a community. Because the majority of the workforce commonly lives nearby, the provision of good social infrastructure is necessary. The participant from Dubai further stated that economic growth cannot be achieved without social values. The structured development of Dubai World therefore contains a new residential area and commercial districts that include schools, hospitals, banking and financing, health care centres, religious facilities, police stations, libraries and universities.

Interestingly, the notion of *equity* could not be associated with any logistics literature and the two executive interviewees have not provided any suggestion regarding their logistics development. This might be because equity is related to issues that are not examined on a particular industry level, but it is combined in many elements such as culture, politics and economic factors in a particular area.

Thus, the social dimension is segmented into the elements of (i) **quality of life / well being** and (ii) the development of **soft / hard infrastructure** (Figure 4.3-4).

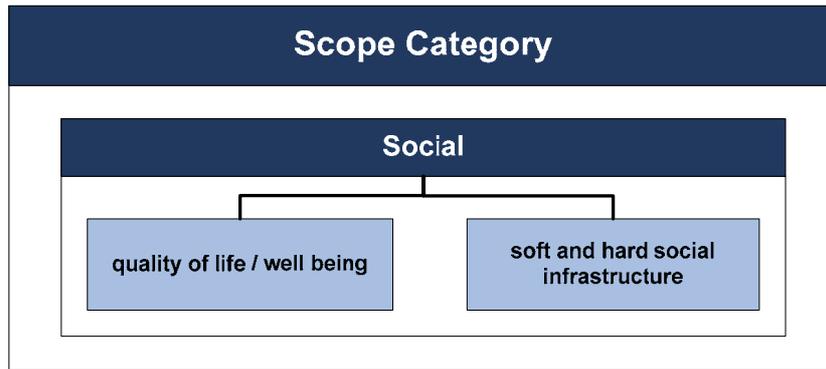


Figure 4.3-4: The preliminary 'Social' scope category

#### 4.3.4 An overview of the 'Scope' category

The preliminary scope category consists of three dimensions that are based on the combination of the 'Triple Bottom Line' theory (Figure 4.3-5). It is understood that this concept enables regional economic growth, provides employment opportunities and ensure income; hence it has a positive social effect regarding material well being. However, it was argued that logistics operations and its facilities have negative effects on the environment and on some social aspects. Indeed, it is found that there are implicit trade-offs between the three dimensions for this logistics driven system. It seems that the scope of sustainability is an element of a desirable development path for a Logistics City-Cluster, but at this time might be confused with the economic viability such as sustained growth.

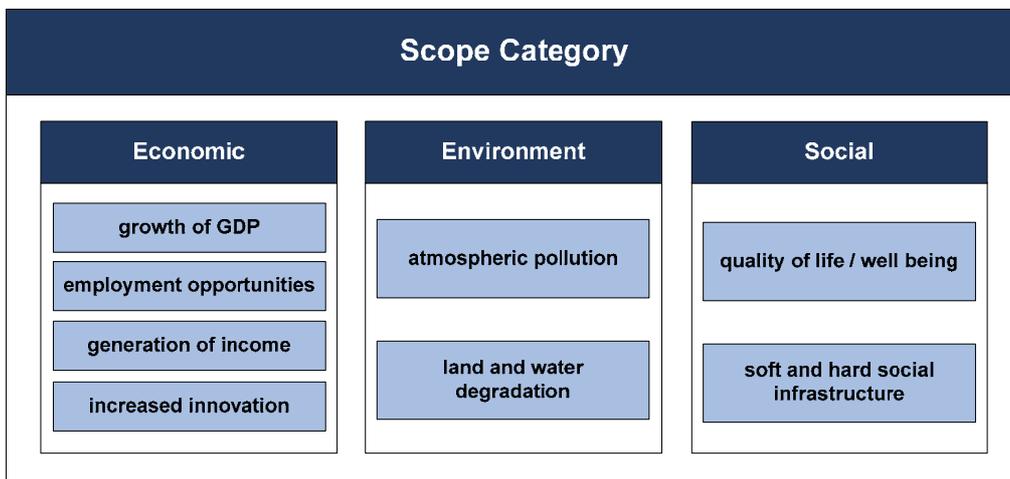


Figure 4.3-5: The integrated 'Scope' category of the preliminary framework

#### 4.4 Concluding 'Delphi Round I'

This Chapter discussed the establishment of a first common understanding of the Logistics City-Cluster concept and has resulted in a preliminary framework, founded on two core categories and their various sub-elements. It is seen as the beginning of the

generation of a formal theoretical base explaining the practical phenomenon of a Logistics City-Cluster. However, the knowledge base of this preliminary framework is still very limited and largely founded on academic and government publications. Consequently, further research will focus on the perspectives of actors that are most intimately involved with the concept. Thus, the upcoming 'Round II' involves in-depth semi-structured interviews with executive stakeholders of existing Logistics City-Clusters. In order to guide the interviews, semi-structured questions that are informed by the preliminary understanding of the 'Enabler' and 'Scope' categories were prepared.

Currently a Logistics City-Cluster can be broadly understood as geographical concentrations of logistics companies and related organisations around one or more international gateways. To extend the preliminary definitional conception, it was necessary to establish participants' meaning of the concept. Hence, following question was asked at the beginning of all interviews:

**Q1-1: Can you describe in simple terms and in a few words what your conception of a LC-C is?**

'Round II' is further aimed to strengthen and deepen the understanding of the preliminary enabling elements and to provide the opportunity to explore new ideas. Therefore all preliminary enabling elements have been briefly introduced to the interviewees before the actual face-to-face meeting, and following open questions have guided the interviews:

**Q1-2: Can you tell me about the infrastructure and the workforce resources you see as important aspects of your LC-C and describe them?**

**Q1-3: What are the core services provided by the LC-C to their clients?**

**Q1-4: Could you provide an insight on the demand conditions of your LC-C?**

**Q1-5: Can you describe the supplier and related industries within your LC-C?**

**Q1-6: Can you describe the stakeholder and governance context in which your LC-C has been created and organized?**

**Q1-7: Can you describe the current condition of regional and international competition in which your LC-C operates?**

As discussed, there are factors that have an effect on the six enabling elements. This notion needed to be integrated in the interviews, to facilitate a richer understanding of enablers' development and to support the interpretation of the data. The following two questions were asked:

**Q2-1: Can you describe the important political factors influencing the characteristics and elements of your LC-C?**

**Q2-2: How did the geographical pattern influenced the character of your LC-C?**

The final factor that plays a critical role for the 'Enabler' category is the identification of the main differences between common trade gateway hubs and the Logistics City-Cluster concept. It will reveal any unique aspect of the participants' perspective and deepens the understanding of the enabling elements and characteristics. Consequently, the interviewees were asked:

**Q3-1: What do you see as being the main differences between an LC-C and a common trade hub or gateway cluster?**

**Q3-2: Do you think that the definition of an integrated logistics platform is sufficient to define a LC-C, or are there other important elements to be added?**

These semi-structured questions concerning the 'Enabler' category will allow a comprehensive descriptive qualitative investigation and is the next step towards constructing a valid knowledge base. Thus, it will strengthen the current enabling framework by providing additional descriptions of the concept which will allow amendments to existing views and the integration of new findings. The intended outcome is the development of an elaborated enabling framework, including sub-categories, possible interdependencies and influencing factors.

Concerning the 'Scope' category, there is still contestation of its understanding, since it seems that sustainability as an aim is not always achievable or even accepted as an element of a desirable development path. Consequently, a deep qualitative exploration of the three dimensions was seen to be necessary and the following four semi-structured questions for 'Round II' were integrated in the interviews:

**Q4-1: What is your perception with regard to economic values of your LC-C that might contribute to the development of the region that it serves?**

**Q4-2: Can you describe the social values that your LC-C contribute to the region.**

**Q4-3: What are the environmental effect that your LC-C has towards the region?**

These will establish a descriptive qualitative understanding of possible values and effects that a Logistics City-Cluster concept embraces. Further, it will allow the comparison of values between various Logistics City-Clusters and will establish clearer understandings of possible interdependencies. By strengthening the current preliminary

notion and allowing amendments, 'Round II' will permit the development of elaborated categories and sub-categories.

The outcomes of the semi-structured question and therefore 'Round II' are compiled into an elaborated Logistics City-Cluster framework. This model will be presented as a rich substantive description and will be discussed in the upcoming four Chapters.

# Chapter 5

## Delphi Round II: The concept of Logistics City-Clusters and an elaborated framework

### 5.1 Introduction and structure of the chapter

This Chapter consist of two major sections. The first part details the elaborated definitional description of a Logistics City-Cluster, bringing together the most current shared executive perspectives of this concept. It presents the results of the 'Round II' data collection and its analysis, which will be reviewed under three separate headings. First, the current concept of a 'Cluster', second the interpretation of the current notion of term 'Logistics' and third, a discussion of the relevance of the 'Geographical Borders' for Logistics City-Clusters.

The second section of this Chapter introduces the elaborated framework, showing its three major contributing categories. In this discussion, a brief review of the preliminary conceptual model is given and the modifications, as a result of 'Round II', are explained. The Chapter will conclude with a presentation of the resulting elaborated framework, setting the scene for the detailed exploration of its contributing elements in the following Chapters.

### 5.2 A definitional conception: Logistics City-Clusters

The following account relates the responses of the executive participants from industry, public departments and academia in Europe when they were asked to begin their interviews with a short and simple description outlining their definitional understanding of a Logistics City-Cluster. Initially, discussion focussed upon understandings of the notion of 'Clusters', which allowed a compilation of perspectives drawn from interrelated stakeholders, in mutually competitive positions regarding the key notion of overarching governance. The second discussion was on 'Logistics', which addressed the topics of gateways, logistics services and activities that are needed to support the logistics sector. Finally, the focus turned to the notion of 'Geographical Borders' by placing particular emphasis on the relative location and dispersion of logistics activities within the Logistics City-Clusters sphere. It is the explication of these three notions that underpins the syntheses of a deeper definitional conception of a Logistics City-Cluster.

## 5.2.1 Interpretations of the current term ‘Clusters’

From the interviews, the notion of a ‘Cluster’ is seen as a geographical concentration of organisations that are intimately linked in ways other than solely a shared management structure. At the most general level, respondents suggested that:

*I think by definition it is a collection of agents, which also include the government. ... Actually it is a concentration ... [of] interrelated stakeholders. They should be in logistics itself and logistics should be defined in a broad sense.*

*A logistics cluster consists of many stakeholders. ... Not just one, two or three participants, but rather many stakeholders and their networks. (Tr.)<sup>12</sup>*

Irrespective of the individual Logistics City-Cluster focus, of particular importance for the interview participants was the notion that the interrelated companies within a geographical area, are involved in a shared competitive relationship. Participants provided very concrete examples of shared competition related to Logistics City-Clusters’ core activities, suggesting:

*[L]ets say [a] street lined with bars could be a cluster. ... [However], only when they start to invest [together] in festivals or leisure ... then it would feel like [a] cluster. ... [I]t is somehow a shared competitive position as a region so to say.*

*We are in Paris this week and in LeHavre, at a presentation for clients. On the one hand we will present the port there, but we also take about 20 port clients with us and meet with 50 companies over there. ... We are trying to establish transport and business relationships with LeHavre and Paris as the cluster Duisburg, not just as an individual company. (Tr.)*

More specifically, the participants indicated that they perceive this competitive position as an essential feature that should be ideally deliberately organised and aligned. Whilst this is implicit in the earlier comment, it is further supported and clearly evident in following comments:

*There is an organisational component to it. ... you would expect to see some sort of governance.*

*At the moment there is also a project proposal by Prof. Clausen that includes over 40 partners within the logistics cluster of the Ruhr area. The project aims to coordinate individual activities as a cluster, which have not been previously aligned. (Tr.)*

Of especial importance here, is the observation that the term ‘Governance’ is specifically mentioned. Whilst this was already evident as a feature derived from existing literature, governance has emerged from these interviews with enough emphasis to suggest that it deserves a key place within the Logistics City-Cluster framework. Another revelation from these discussions was the notion of ‘interrelated stakeholders’. In alignment with various comments contained in the literature, the Round II respondents insisted that organisations associated with the core activities in a

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<sup>12</sup> Tr.: Translated by Inke Sieloff / NAATI No. 61730

broader way need to be included in the definition. In this respect, participants expressed these opinions:

*As has been said before ... it is a cluster that is characterized by the existence of a great variety of logistics activities ... But also research, logistics support services and political institutions are part of the cluster. Thus, there is an integral configuration of many different participants. (Tr.)*

*Many stakeholders are involved in a cluster, such as logistics companies, industrial businesses, research institutes, universities and the government. (Tr.)*

In parallel with the notions of governance and wide range of interrelated stakeholders, the interviews have also revealed an agreement that the alignment of activities by interrelated independent organisations will enable significant benefits to accrue. Indeed, in the words of the respondents:

*What is important is that you coordinate individual activities as a system. That increases the efficiency and competitiveness of the region and has an enduring positive economic effect on all stakeholders involved. (Tr.)*

*There are firms actively trying to create combined benefits as a cluster. These benefits are felt individually but also regionally. ... However, there is also competition between the stakeholders.*

Clearly, the view of the respondents of increased benefits due to cooperative alignment between organisations from various backgrounds in a specific geographical area, supports the earlier findings. However, whilst there is a shared competitive position as a region, there is competition between the interrelated stakeholders. Hence, the notion of 'Competition' is also an important element of a Logistics City-Cluster. This implies that the cluster construct is partly defined by this somewhat paradoxical feature of a shared competitive position and individual competition within the cluster, which both positively affects long-term stability and growth of the region as a whole.

### **5.2.2 Interpretations of the current term 'Logistics'**

The core elements and distinguishing characters of clusters are embedded in the main industry activities. Therefore, the semi-structured interviews provided a loose definitional boundary that allowed interviewees to freely talk about these core activities, which they perceived as being the main components of a Logistics City-Cluster. At the most fundamental level, it appeared that the core activities are all somehow related to the notion of 'adding value' to goods by logistics services. Often this occurred simply by facilitating connectivity to and from markets, irrespective of whether these markets produce or consume goods or how distant they are, as described later in the 'Market' enabler. Important here is that connectivity has a number of essential elements that focus on transshipment, consolidation and transport. This commonly translates, in a

physical sense, to a gateway function and its transport corridors. In discussions, this notion arose with several interviewees, and they agreed that:

*[L]ogistics begins with connectivity, translating into a gateway. ... I guess you can do an IT cluster in Bangalore without much physical infrastructure. That is possible but logistics request physical connectivity. Therefore, a node and transport infrastructure is essential.*

*There are industry sectors that are highly developed ... [and] which employ many people. ... If you look at this region, logistics is the primary sector. ... Hence, the role as a logistic hub and the associated infrastructure is very important. (Tr.)*

Indeed, implicit in some perceptions of the executive interviewees from Europe was the clear notion that the main “Trade Gateway” is the nucleus of a Logistics City-Cluster. This evident in comments such as:

*I think the main aspect of a ‘Logistics Cluster’ is a certain node such as a seaport, airport or a rail based hub. That is [the] core element.*

From several comments, regional and local connectivity has emerged has a strong basis for Logistics City-Clusters, supporting the preliminary findings. However, it appeared that physical connectivity, notwithstanding the kind of transport mode and related infrastructure, must also enable international connectivity. This was highlighted by several senior participants when they said:

*There is always a type of infrastructure on European or a global level. I think the core is ... the international seaport [and] airport.*

*Of great importance for Hamburg, as a location in the European and worldwide logistics sector, is the seaport but also the rail connectivity. (Tr.)*

*I would definitely say that providing international connectivity is a core element.*

One very interesting observation to surface was that the focus is not so much upon the local gateway function, as on the regional and international functions. It therefore appears that its main value is linked to regional and international functions, and consequently to the nature of the related market. In this regard, one informant asserted that:

*There is not much relation between the port and the city. The relations are very much between the Netherlands as a whole and the port function.*

Certainly, the Logistics City-Cluster is undoubtedly an asset for a region if it serves all three functions, which immediately suggests the need for massive ‘Infrastructure’ and its associated transport networks, as it will be reviewed as an enabling element in the next Chapter. This multi-focussed connectivity, provided by gateway functionalities, was highlighted by a number of respondents, who observed:

*Well, as far as I'm concerned, a 'Logistics Cluster' is a location that is integrated in ... large international commodity flows as well as smaller regional and local transport networks. (Tr.)*

*[W]e believe that we are unique, due to a strong European airport and also a global seaport. In addition to that, we are the third largest inland water transport location and have good regional rail and road connectivity. (Tr.)*

This generic view that is being generated appears to be independent of whether these trade gateways are involved with shipping, aviation or are rail-based. The specific choice is of course linked to 'Geographical' factors, an element of the 'Influences Category' described in Chapter 7. What is of particular importance here, is the agreement that at least one major international trade gateway providing international connectivity is essential to form the basis of a Logistics City-Cluster. Some specific comments were:

*[A] seaport cannot be constituted as a core element of 'Logistics Cluster', because otherwise Zaragoza cannot be classified as one. ... Zaragoza has the massive airport and an international rail hub. So in a generic sense the international gateway itself and the networks are the key.*

*I think at least one global gateway ... is essential ... for example ... a seaport. Two international [gateways] are not really needed but [are] common.*

In regards to trade gateway connectivity as a key logistic definer, there is the more subtle observation of both forward and backward linkages. These linkages translate into specific logistics activities and their related agglomeration forces. For example, one manager stated that:

*[The port] is the centre of the city and then you have the forward and backward linkages. ... Those relate to the basics logistics function such as transshipment and transport [services] that are aligned to the seaport.*

Thus, with respect to the logistics industry sectors, it is clear that basic or lower value-added activities such as a terminal operations, transportation and simple warehousing activities are perceived as being essential activities within and related to the trade gateway, as indicated in following comment:

*What do I mean by that? Well I think you need transportation companies and warehouses. If there is no inventory it is hard to say there is something like logistics.*

*[A] 'Logistics Cluster' is a location that is integrated in logistics networks, in which goods are transhipped, stored and processed. (Tr.)*

Whilst these lower value-add activities will depend on the kind of gateway; they will always have a strong influence on the characteristics of further forward and backward linkages, particularly for supporting non-logistics services such as ship financing. From this discussion, it is clear that the nature of the trade gateway, in terms of its logistics activities, will have a determining influence on the actual setup of the entire cluster.

However these lower logistics value-add services are not the only decisive factors in defining a Logistic City-Cluster. The essential issue to be fore-grounded is the presence of critical mass of higher logistics value-add activities. Subsequently, the designation of a particular metropolitan area as a Logistics City-Cluster is more elusive; this was a point well illustrated by some respondents, who ruminated:

*[I]f you can bring down the containers, maybe you can do some consolidation. Once you doing that, you may be able to put a regional headquarter there. Why not built upon that and do light assembly and further value-add. ... The transportation hub is passing and a logistics hub is growing ... So the core for me would be storage and the related higher value-add ... and the availability of supply chain management capabilities.*

*[A] port is simply a quay providing transshipment. This alone is not much of value. It's all about logistic activities that generate a large amount of value-add. ... [T]hat would be activities such as light manufacturing or customising as well as packing and labelling. (Tr.)*

It appears that, according to the high-profile respondents, without any higher value-adding logistics services such as light assembly, customizing, or packaging and a well developed and designed supply chain management system, an area should not be designated as a Logistics City-Cluster. Respondents indicated that, in this latter case, they would regard the centre as just another transportation node:

*Would I consider ... [XYZ] as a Logistics City? No. ... [Y]ou need to bring the cargo of the ships and stay for a while. On top of that you have to do something to the goods like customizing. Then you are a logistics hub. That is the difference between a transportation hub and a logistics hub.*

*The fact alone that you have a port, like in [XYZ], is not enough... The hinterland infrastructure there is nothing to write home about ... [and] the integrated logistic package does not exist. It's not just the transport and transshipment of goods ... but rather the high value logistic activities that constitutes the core of a 'Logistics Cluster'. (Tr.)*

Notwithstanding these somewhat parochial responses, there is general agreement that the basic logistics activities are a necessity for a Logistics City-Cluster to attract and facilitate higher value-added services. Certainly, these findings support the earlier discussions on a logistics node evolution, and it further emerged that this combination of lower and higher value-added 'Services' is a major element of a Logistics City-Cluster definition, as evident in the following statements:

*[Within] Logistics City-Clusters ... all those logistics capabilities are available.*

*You have to be able to provide [all] those logistics services. And those services need to be executed in a very dedicated way.*

Indeed, it appeared that the emergent hierarchy of logistics activities in terms of value-add is also closely linked to geographical distance. Hence, international, regional and local connectivity is correlated with particular logistics lower and higher value-add activities. Respondents have consistently noted that:

*They are related to global transport and transshipment function. ... Then you have regional functions that related to distribution of the container or customizing of goods. In the local regions the container is opened and the goods get their final polishing.*

Further, in parallel with the notion of the logistics lower and higher value-add services, an interesting and significant revelation emerged. It was mentioned by a number of respondents that the presence of supporting industry is a critical element of Logistics City-Clusters. This is evidenced in such comments as:

*[S]urrounding to the logistics activities you have ... ICT and engineering companies. ... Of significance also are universities and research facilities for the logistics sector. ... [A]ll kind of related companies [that] provide services to the logistics sector ... [are] of importance.*

*[S]upporting to the logistics industry is ICT, R&D and engineering, architects, advertising, banking, insurance. ... [Additionally], there is accounting, maintenance and leasing. That is very important.*

These so called supporting industries appear to be necessary, since their services and products are essential to the smooth functioning of logistics industries. Their presence, especially if they operate at a sophisticated and international competitive level, will help to create potential advantages for Logistics City-Clusters. As indicated in the above comments, research and development which enhances services through the generation of 'Knowledge' are an integrated part of the model. In essence, although the focus is on logistics activities, the combination of all interrelated sectors is critical to create a comprehensive Logistics City-Cluster, as is clearly stated here:

*For logistic clusters, the availability of a variety of transport modes and logistic activities is critical. ... [B]ut this includes also supplementary services supporting logistics, such as financial services, insurances, ship financing. Of course you need a well-educated workforce for all these activities. Without these you can't do anything. (Tr.)*

As indicated in this quote, the existence of appropriate quantity and quality services in all sectors inevitably involves a trained and qualified workforce for their actual operation. The availability of competent 'Workforce', another enabling element, will strengthen the Logistic City-Cluster as a whole.

### **5.2.3 The relevance of geographical borders**

As identified in the preliminary model, a Logistics City-Cluster is seen as a geographical concentration of organisations that are meaningfully linked to each other. Whilst the core nature of the organisations involved are associated with logistics and supporting activities, there still remains an important question related to the nature of geographical concentration and its related physical border. Drawing a geographical border around any type of cluster is not easy, because of the often non-contiguous nature of the contributing activities and the pluralistic notion of stakeholders. This

situation is especially so for a Logistics City-Cluster where its core activities are spread over a wide area. Respondents specifically noted that:

*[A Logistics City-Cluster] is where a high concentration of logistics activities [occurs]. The concept and its borders, however, are always very loosely defined.*

*I think it is quite difficult to put a border around the 'Logistics Cluster'.*

Indeed, what has tended to emerge regarding the difficulty of determining a geographical border is that logistics activities are not only located around trade gateways but also along their trade corridors in dispersed manner. There are various determinants that have the effect of forcing logistics activities, such as value-add functions in warehouses, out of the major gateway and away from its proximity. This development was evident in comments such as:

*[W]hat you quite often see is that ... 'Logistics Clusters' tend to extent from the gateways along the main corridors to the hinterland. Then you have an issue to define an appropriate geographical scope. ... Rotterdam for instance integrates the logistics structures along the inland waterway system from the city centre till the north sea into their cluster. ... We are talking about a distance of more then 30 km.*

*Along the river Elbe, we have logistic activities in Stade and Brunsbuettel. Then there are a few distinct logistics locations along the road and railway network. ... Of course, in Hamburg itself we have the port in the south. Then in the east there are Rotenburgsort and Billbroek ... which are strongly influenced by logistics. Well, and then there is the airport in the north as a logistic node. (Tr.)*

The reason for this development lies in land scarcity and the related high land prices in or around existing gateway. Further it appeared that logistics activities, such as those related to distribution centres, tend to move along the trade corridors because of optimising the transport function relating to international, regional and local connectivity arrangements. Some interviewees responded to these issues very specifically, as echoed:

*These here is the optimum because the land is cheap and ... you have the transport advantage of an intermodal gateway. ... [Additionally] you have already the relative advantage regarding a better market proximity.*

*[L]ocation ... is very much related to the optimisation of the transport function. ... Close to a particular market you can react in one hour, but at the gateway you have the transport options to bring it to various markets.*

But, also the nature of the commodities and goods has a critical influence on the geographical sphere of logistics activities. Logistics centres of certain goods, in particular perishable items, must be closely located to their final markets, whilst the logistics services for other types of goods can be centrally located. This involves much greater travel distances between production and final destination, as indicated in this comment:

*You can also say for some Distribution Centres the optimum is in the port and for some the optimum is at the market. ... [O]n each product level there is a different location optimum.*

Thus, determining a boundary for a Logistics City-Cluster depends upon the responsibilities of the area's agglomerating logistics activities, rather than clear physical logistics node boundaries. Whilst the level of responsibility of the area differs between various stakeholders, it is a particular concern for political authorities who have oversight of urban planning and the macro-economic development of a region. Consequently, the role of 'Politics' on Logistics City-Clusters emerged as an important influential factor. However, overall there is an imperative for the commercial sector to take their responsibility towards the region seriously, as indicated by this statement:

*The Senate constitutes the nerve centre for infrastructure development and economic planning of this region. ... The now retiring Senator has strengthened the feeling of joint responsibility by successively building a strategic collaborative network of all stakeholders in the area of logistics. ... [T]he important associations are involved, as well as the big industrial players, the Chamber of Commerce and all relevant government departments. (Tr.)*

Indeed, for some Logistics City-Clusters, particularly where activities are widely dispersed and historically grown rather than 'Greenfield' developments, a possible boundary will necessarily include a large surrounding area. This has an important impact on the notion of political responsibility. In the case of an extended boundary, a possible border may include several local councils and, in some extreme circumstances such as Hamburg, even different federal states. This consideration was mentioned particularly by respondents whose administrative remits were significantly affected by planning border related issues:

*I am not sure whether you would say we have a logistics cluster in Venlo ... one in Rotterdam ... one in Amsterdam or whether we would say this ... complex functions as one and has a shared competitive position.*

*We have this construct of the metropolitan region of Hamburg, which actually includes three federal states. ... The city of Hamburg and the proximate regions should be strengthened holistically as a metropolitan region in the field of logistics. (Tr.)*

Hence, the significance of drawing of an undisputable physical geographical border around a Logistics City-Cluster should not be over emphasised. From the respondents' perspective, it seems that political and planning boundaries are of more importance. In this regard the critical factor is that Logistics City-Clusters benefit and increase its competitive position if efficient planning in the area is achieved. Indeed, this includes the alignment and coordination of the different stakeholders' activities and their responsibilities. This is especially pertinent when different government planning

authorities are involved and *'Capital'* investment into the development and maintenance of infrastructure requires their coordination.

#### **5.2.4 Interim conclusions**

The responses regarding the definitional conception of a Logistics City-Cluster enabled a general consensus about the notional 'architecture' of the interim framework. Core activities were seen to be related to the logistics value-add activities, whilst respondents' perceptions indicated that they are separated in lower and higher value-add services. Further, various types of supporting industries that are demanded by logistics activities must be incorporated into a Logistics City-Cluster. The importance of gateways as an integral component has clearly emerged since it provides the needed nucleus for international, regional and local connectivity. It is evident that the gateways and their major transport modes give shape to many logistics services and supporting industries within a Logistics City-Cluster.

Further, of singular importance was the somewhat anti-intuitive claim that the interdependency of the logistics companies, supporting activities and government authorities, is a major determinant of a Logistics City-Cluster. Whilst it is agreed that different stakeholders will have different objectives that might compete, they are nevertheless in a shared competitive position as a cluster. Therefore, it is posited that these interrelationships and shared competitive position should be co-ordinated through collaboration embedded in the system. It is in this context that agreed administrative and planning boundaries, to enable co-ordination, are of more importance than clearly defined physical boundaries.

### **5.3 An elaborated Logistics City-Cluster framework**

Based on the initial interviews with respected commentators and a detailed literature review, the preliminary model was divided into two sections: the 'Enabler' and the 'Scope' category. The overall 'Scope' of the Logistics City-Cluster had been identified earlier to be a sustainable global integrated logistics hub, located either inland or on the coast. This was the source for our differentiation between the 'Economic', 'Social' and 'Environmental' contributions of a Logistics City-Cluster. Secondly, in order to achieve the status of a global integrated logistics hub, there must be a strong strategic foundation. To allow investigation of this basis, the initial investigation suggested six 'enablers' as important determinants. These were 'Services', 'Infrastructure', 'Skilled Workforce', 'Governance and Policy', 'Demand and Supply' and 'Stakeholders'.

This resulting conceptual understanding was used to guide the development of the semi-structured interview protocol, and has further helped in the analysis of the responses. This second iteration has allowed the development of a more systematic and sophisticated knowledge base that more accurately represents current understandings and provides clearer definitions of the set of categories that characterise a Logistics City-Cluster. It has also aided the development of a more complex description of the relationships between these categories.

### **5.3.1 Reflection on the amendments of the preliminary framework**

To assist the reader to understand the complex data analysis of Round II, a brief overview of the resulting extension and amendments to the preliminary model are given. In particular, it is important to indicate that the initial two core categories of the model were amended and a new category emerged. Whilst the detailed justification for this decision will emerge during the discussions in Chapters 6, 7 and 8, the following paragraphs begin to develop arguments for these modifications.

The earlier identified 'Enabler' category of the preliminary conceptual model still remains, but it has been considerably strengthened and elaborated by reference to the material gathered from the interviews. As a result, it has been elevated to be the core component of the Logistics City-Cluster framework, notwithstanding the fact that its subcategories have been altered. The detailed discussion about the revised 'Enabler' category, which now consists of eight subcategories rather than the 6 preliminary elements, is provided in Chapter 6. It will reveal cause and details of the name amendments, the merger of elements into a combined category and development of new subcategories.

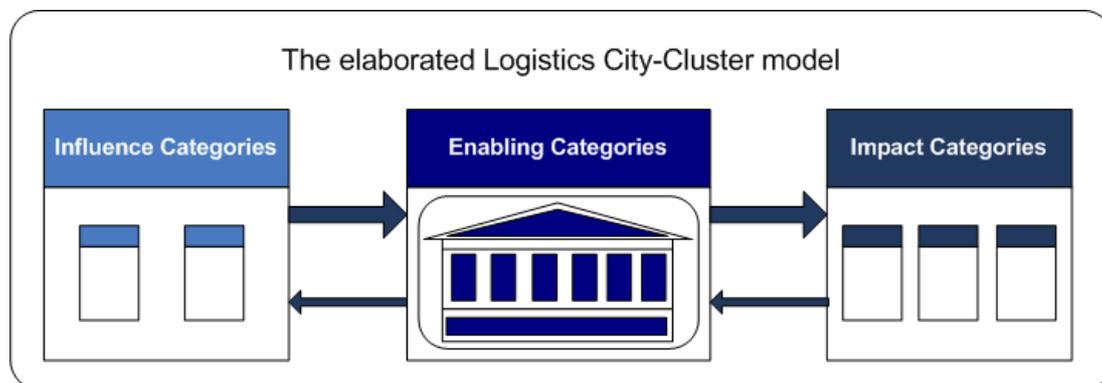
By contrast, it was found that the 'Scope' category of the preliminary framework has changed its central meaning, and therefore has been altered to reflect this new understanding. Early in 'Round II' it became apparent that the participants perceived the 'Scope' as an outcome or, more strongly, as the impact of a Logistics City-Cluster upon the region. As a consequence, the centrality of the notion of the effects was recognised, and the 'Scope' category was relabelled as the 'Impact' category. Notwithstanding the change of theoretical stance, the subcategories remained the same and are still based on the notion of sustainability.

Whilst the two preliminary core categories were used as the base for the semi-structured interviews, it appeared in the very early stages of 'Round II' that the factors

that have an effect on the six enabling elements could not be clearly integrated. Given that, it was considered necessary to describe these factors within their own major category. Consequently, the role of 'Politics' and 'Geography' are now added to the model under the umbrella of the 'Influence' category in light of the analysis. Perhaps, in hindsight, it appears that the added 'Influence' category may have warranted immediate inclusion as a separate category in the preliminary model. As discussed in the review, Porter (1990) identified the contribution of government as an integral part of his paradigm of national competitive advantage, wherein its role is described as an influence towards the four determinants of the competitive advantage of nations.

### 5.3.2 The elaborated Logistics City-Cluster framework

As a result of these modifications the elaborated Logistics City-Cluster model now consists of three main categories; the 'Influence' category, the 'Enabling' category and the 'Impact' category. In common with balanced theory attributes, these three categories are interdependent. The 'External Influence' category, and therefore its subcategories, can influence and can be influenced by the 'Enabler' subcategories. At the same time, these subcategories affect the 'Impact' category and vice versa. Figure 5.3-1 illustrates the main categories of the elaborated Logistics City-Cluster model and indicates their interrelationship.



**Figure 5.3-1: The elaborated Logistics City-Cluster framework**

The next chapters will explicitly describe each of the three core categories, their subcategories and related properties, which are grounded in the data from senior executives of four leading European Logistics City-Clusters. It will start with the 'Enabler' category in Chapter 6 and then passes to discussions related to the 'Influence' category in Chapter 7. Both consolidate findings regarding the second core research question. The description of economic, social and environmental impact of a Logistics City-Cluster will be dealt with in Chapter 8, which captures notions of the third core question.

# Chapter 6

## Delphi Round II: Explication of the enabling categories

### 6.1 The enabler category of Logistics City-Clusters

As a result of the modification, the preliminary enabler category and its sub-categories now involve eight enabling categories (Figure 6.1-1). The ‘**Infrastructure**’, ‘**Service**’ and ‘**Workforce**’ categories have kept their generic labels, but their properties have been significantly enriched. The new ‘**Capital**’ subcategory emerged from the original *financial* component of the infrastructure enabler. The preliminary *proximate demand* subcategory was amended, its description being significantly broadened and renamed as the ‘**Market**’ sub-category. Additionally the *preliminary stakeholder and governance / policy* enabler, were merged into a new combined category called ‘**Governance**’. Finally, two new sub-categories, labelled ‘**Competition**’ and ‘**Knowledge**’ have been created.

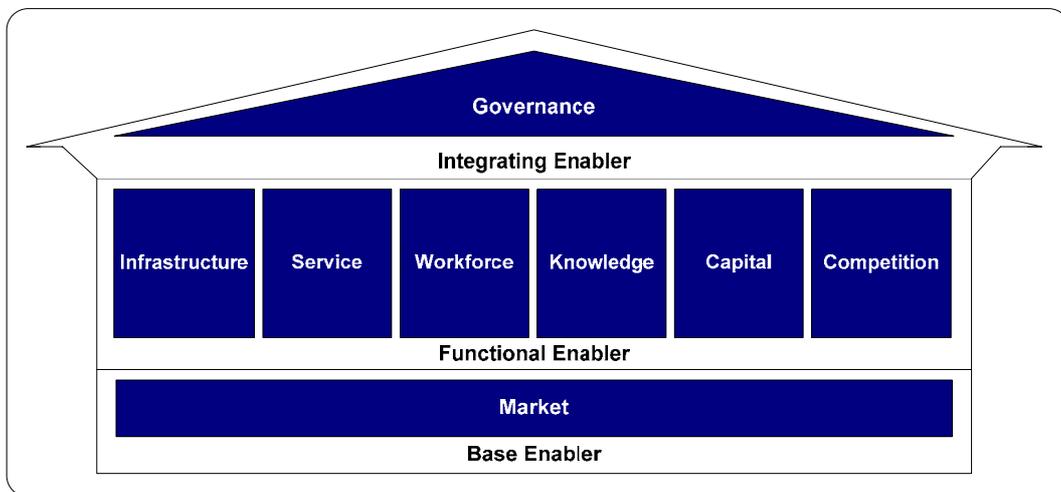


Figure 6.1-1: The elaborated ‘Enabler’ category

The following discussion presents these eight enabling categories, starting with the description of the market category as the base enabler, which creates the demand in the first instance to establish and operate such system. This is followed by details of the six functional enablers that are characterised by the particular nature of the base enabler. These six enablers are the core determinants of the cluster’s strategic design and provide functions to promote a competitive system. The Chapter then will deal with the governance category, the integrating enabler, which aligns and co-ordinates the

base and functional enablers to generate benefits for the cluster, and ends with a discussion on the perceived importance of the categories and their dynamic character.

### 6.1.1 Market Enabler

Logistics City-Clusters are associated with densely populated metropolitan areas that have inherited demand for logistics activities. Early in this 'Round II' it appeared that this demand, which we now refer to as 'Market', can be usefully divided into the **manufacturing and retail / wholesale segments**. In the preliminary stage, the importance of proximate demand was appreciated; but, it was found that demand should not only be defined in terms of *local or regional area* since it is also associated with *international locations*. Additionally, the notion of market segregation needed more detailed description regarding its *size and quality*. The collected comments from informants in the following paragraphs amplify the significance of the 'Market' enabler, and demonstrate its role as the critical base for the functional enablers of Logistics City-Clusters.

#### 6.1.1.1 Segmentation of markets

It was reinforced that the demand of operational logistics activities by the markets is indisputably the foundation for Logistics City-Clusters. Markets are generally perceived as activities that generate the flow of commodities and value-add activities handled by logistics. In this context, the participants distinguished between the manufacturing and the wholesale/retail markets, as categorically stated:

*First of all you have retail and the manufacturing industries. They create the logistics demand. ... Recently, for example, Schizedo, a Japanese cosmetics manufacturer has located here and Dedbaering who produce clinical diagnostic equipment. Or Verbatim, who manufactures computer components. (Tr.)*

*[I]t is good to have some of the demand sources here, which you can use as an anchor, for instance manufacturing companies such as General Motors. ... Of major importance for Plaza Logistica in the beginning, was the DC of the textile retailer Zara, but now we also having toys or sport article retailers here.*

It appeared that the two market segments and their commodities have different demand specifications on the logistics activities. For example, demand created by the retail food sector must be consistently and continuously monitored because of the short turnover time for perishable and high-demand goods. Whilst there are often less demanding physical transport issues involved in manufacturing markets, there are similar scheduling pressures where companies work on a 'Just-in-Time' (JIT) or 'Just-in-Sequence' (JIS) basis. The magnitude of this pressure on logistics activities is appreciated when considering the size and power of some market companies. Any

interruption to supply will put logistics contracts in serious jeopardy, which in the end has a negative impact on the cluster. These points were made by respondents:

*When it comes more to the issue of manufacturing ... [w]e have Toyota as the international leader located here. ... They integrated JIT / JIS processes and demand a 100% timely delivery. If you cannot match these requirements there will be tough contract penalties.*

*[G]lobal consumer brand companies like Heineken or Unilever are located here. They want top quality. ... If we as the system can't serve, they might go to another location to distribute from.*

Indeed, the duration to deliver the logistics services and the window of opportunity for serving the markets is imposed by the particular demand conditions of the commodities. As a consequence, the infrastructure and services of a Logistics City-Cluster must be ready to cope with a wide range of the market's commodities. Another interesting issue relates to the shorter market lifecycle of technology-driven goods. Short lifecycles have changed the nature of supply chains, which impacts on logistics services and infrastructure requirements. The following two quotes illustrate the challenges generated by the specific demand requirements:

*[E]verybody was talking about a 24 hours economy. [However], what exists is from 6 in the morning until 8 in the evening. ... [This is] not because logistics companies don't want to, rather because the retailers refuse it. ... This reduces our timeframes, meaning that we have to handle the same amount of goods with the same amount of capacity in a shorter timeframe.*

*[Due to] the shorter lifecycle of products ... it is very important that the products are sold in the early stage ... So then it makes sense [to] rearranges your supply chain and have much more stock before the product launch ... since [diminishing] ... sales price is far more costly.*

Clearly, special requirements of the markets depend on the nature of the commodities and any attempt to provide an exhaustive description of demand functionalities would be presumptuous. However, based on these few examples, it is concluded that the nature of the commodities will intimately influence the setup and the quality of the functional enablers, such as the logistics and ITC infrastructure or the logistics services. Important here is that although there are significant differences between the demand of the market sectors and their commodities, there will always be the need for reliable logistics services.

### **6.1.1.2 Local, regional and international markets**

Local and regional markets play an important role for a Logistics City-Cluster as identified in the preliminary model. Therefore, not surprisingly, the agglomeration factors of short distances and reduced delay risks were widely discussed in the interviews. The implicit proposition here is that Logistics City-Clusters naturally appear

in locations and regions that have strong markets. Respondents further provided an understanding of the local and regional share of logistics activities and discussed its significance for the cluster. Hence, the existence of strong local and regional markets is seen as an excellent base to develop a more sophisticated logistics platform, involving specific market requirements, as is emphasized in these quotes:

*Somewhere where you are close to the market you need to locate your warehouse. ... The distribution centres move towards the gravity point, [which] is based on distances ... [to] the people [and] their buying power. Due to the regional market we are such a strong logistics location.*

*The local area is part of [the demand], but also the adjoining regions. ... [If], for example, the regional demand for logistic services loses momentum, the transshipment and light manufacturing activities would diminish to a great extent, ... since the local demand presents 33% of the total share. (Tr.)*

*The larger the local demand, the more interesting it is for logistics operators to locate here. ... The local component is important and this is why we are such a strong logistics location. If we did not have the local demand, the logistics companies could just go elsewhere. (Tr.)*

Indeed, proximate markets and the Logistics City-Cluster have a symbiotic relationship. Whilst the logistics activities are enabled by the demand of the local and regional markets, these logistics activities strengthen the market segments. Hence, a well-designed logistics system can not only provide efficient services, but also attract companies from the market segments to locate in close proximity. This is an additional driver for infrastructure development, since it provides a solid base for initial investments. In this context, the market segments perceive logistics services and related infrastructure as a competitive weapon to increase their business activities. These ideas are strengthened by the following comments:

*General Motors had to close one of its plants in Western Europe. ... In the end ... it was in Portugal. ... At this point we realised that we needed something that complimented the existing manufacturing structures and provides future alternatives. Logistics was the logical choice due to its defensive and offensive character. Meaning it prevents manufacturing and retailers from leaving ... and also attracts new companies since it is a perfect place for distribution.*

*[L]ogistics is the competitive weapon for the companies. ... The retail and manufacturing companies nowadays compete through logistics. ... Be quicker, be more reliable. ... That is the reason why the government pushed the logistics sector and transport infrastructure development.*

Hence, the Logistics City-Cluster is seen as a strategy to increase the attractiveness of local and regional markets. Despite the importance of proximate markets and its symbiotic relationship with logistics, every cluster has a profound international role. First, global trade has increased and, secondly, the two interdependent market segments are not necessarily located in the same area because of their own key

economic imperatives. These two factors have led to the establishment of massive global networks for Logistics City-Clusters, as is verified by following statements:

*In logistics there are two spots where you likely locate your logistics activities. One is near the factory and [the other] to the customer. Preferably you want to be at both, but they are commonly not in the same area. ... For us manufacturing is located overseas and our logistics location will attract the trade from there for further distribution or customizing.*

*In retail, 90% of the things on the shelves come from other countries. ... Nowadays it's normal to have preproduction in different countries and then get the products here for final assembly. Bazaar economy, as it is called. (Tr.)*

It emerged that significant parts of the services and infrastructure must be suitable to act as an international node to efficiently integrate dispersed markets. Indeed, some efficient Logistics City-Clusters, such as Singapore and Dubai, are mainly driven by international purposes, indicating that their markets are predominantly global rather than local or regional. In this context, it is important to understand the nature of the market location, since those strongly determine the setup of the cluster. The participants argued:

*I think 40% is sea-sea, representing Rotterdam's function as an international transshipment hub. ... [A]nother 40% of all containers entering Rotterdam stay in this region. ... 20% are land transit to Europe. ... [T]he infrastructure and services must be suited for each of the functions.*

*You could say that 1/3 [of the goods] stays within the region. 1/3 goes to the European hinterland by railway and road. ... [T]he last 1/3 is pure ship-to-ship transshipment. For each of these functions, respective infrastructures and services have developed. (Tr.)*

An area concentrating logistics activities that serve only a small region is not a big asset regarding economic development and will not attract much investment. Regional economic value is created predominantly by linking to huge international markets. If, for instance, a Logistics City-Cluster acts as the entry point for secondary markets in Europe, there is value-add possibility at local or regional level through postponed manufacturing or customizing. Consequently, local and regional markets become more significant when combined with international markets, as is demonstrated in these comments:

*[E]very logistics cluster that only serves the home market is not really that interesting. You really need to integrate the international function to create more value for the region. ... For example Rotterdam is the point of entry for fruits and then you provide value-add by creating juice and put it in tetras. Then you serve it to secondary nodes.*

*[I]nternational demand is very important for this node. The goods arrive here from overseas and undergo light manufacturing and are then distributed on a European scale. Vice versa for the overseas export. (Tr.)*

Logistics City-Clusters favour specific markets, based on various factors such as cost, time, historical bonds and relationships of authorities. For example the maritime-oriented Hamburg is dominant in the trade with China and eastern European countries

for containerised cargo, whilst Rotterdam is the leader for bulk commodities such as oil, coal and ore that will be processed and distributed into Europe. Despite the favouring of particular markets and commodities, there must be multiple relationships, since this will strengthen long term development and provides resilience against the dynamic character of markets. There is no doubt in the minds of the informants that this is critical:

*China is an important trade partner for Hamburg. This is with regard to regional consumption but also distribution. ... There are historical reasons for this, but the word has got finally out that transport to eastern and southern Europe via Hamburg is highly efficient. (Tr.)*

*[R]esilience ... general refers to the ability to regroup from a disaster ... For us it is the advantage that we are equally distanced from various ports and have access to different markets. ... If any of them shut down you have the others. So it is a very resilient location, which we claim has a positive long term impact.*

*International trade networks and regional demand are somehow connected. It's barely possible to separate them anymore. ... The region demands the goods from China after all and, thus, logistics is active on international, regional and local levels. (Tr.)*

Hence, a cluster will be successful when linked to manufacturing and retail/wholesale markets in local, regional and international locations. This variety of markets, even when some markets are more focused than others, is crucial and is the base enabler for Logistics City-Clusters. At this point it should be noted that the accessibility to any markets depends on geographical location, which will be discussed in Chapter 7.

### **6.1.1.3 The role of market size**

When developing Logistics City-Clusters, the size of the related markets is a key determinant to ensure that economy of scale is met. A critical minimum market helps to legitimate the development of the functional enablers. It justifies expensive infrastructure, determines the number of logistics operators and the required size of workforce. In this respect, the concept of 'size' should not only relate to the number and size of the market companies, but also needs to consider the relevant population and its buying power, the demand origin of retail/wholesale markets. The informants insisted that this is one of the fundamental issues:

*That does not just mean the agglomeration of companies ... but also the concentration of consumers. It is due to the dense population that we have so many retail businesses here. ... We have this enormous urban centre here that has to be catered for. (Tr.)*

*[It] goes without saying that Rotterdam has the scale of demand to enable investment in logistics systems. ... By that I don't only mean companies demanding logistics, but also the end customers with high buying power. ... [I]n the surrounding 500km ... you find 215 Million people with money. That is why we have so many distribution centres here.*

Such considerations underscore the importance of identifying the economic nature of the market sectors to allow a priority and justification for added investment in the functional enablers. This is of significance since capital accessibility needs to be tailored to particular logistics activities and infrastructure demanded by the markets. Also for a logistics workforce, different markets have specific requirements, which inevitable has a linkage to the needed labour skill and size. Hence, the question of which supply chains are of greatest importance for a Logistics City-Cluster needs to be answered, since enhancing those supply chains will strengthen the entire system. The notion of the market's nature is pinpointed here:

*For our location, the retail sector is important, since this area has a very high population density. That means groceries, electronics, clothing, and household goods. ... This is why distribution and light manufacturing of these goods are of prime importance. (Tr.)*

*The steel mills and the associated imports of raw materials are important for this location. ... But there is also the chemical industry, which is responsible for imports and exports in the bulk and container sector. (Tr.)*

Measures that can be used to estimate the economic strength of market segments are the percentage of the 'Gross Domestic Product' (GDP) and total employment. It is important when gathering such statistics that there is an unambiguous definition of what kind of industry and employments are part of the targeted sector. Further, the number of world class companies, whether these are national or foreign champions, associated with or located in a cluster can provide an insight in the importance of markets. The complexity of this identification was indicated by a number of respondents, who noted:

*[T]he percentage of the GDP ... constitutes [to] the economic specialisation.*

*[Y]ou look at large global players ... that have a strong influence. ... It could be a Spanish company or international company. It does not matter. ... [I]mportant is that their activities are here.*

*This sector provides about 7% of employment. ... That is were we focusing our logistics capability on. ... I think the number of world class firms is much better to understand the strengths of the markets.*

Although, there is no single agreed measure to guide this evaluation, a careful appreciation of the introduced contributing factors is supportive. Indeed, strategic decisions to commit resources on particular elements of the functional enablers should be based on the identified core markets.

#### **6.1.1.4 The relevance of the quality of markets**

If the Logistics City-Cluster is involved with a certain number of quality markets, then it follows that the functional enablers must be at an adequate level to satisfy the needs.

Demands for quality logistics services put continual pressure on the cluster to meet and maintain high standards and this pressure will create widespread benefits. It results in increased efficiency and competitive prices, and the logistics providers adapt to changing demands more quickly, enhancing their innovative profile. These abilities result from the necessity to create business opportunities, as stated here:

*The German retail market is one of the most difficult on the planet. It is under enormous pressure and passes this on to the logistic service providers. ... This forces the logistics operators to optimize their processes and to introduce technological innovations. (Tr.)*

*Today's standard cars were different couple of years ago. ... After a certain amount of time special components become standard. In logistics it is the same. Here, the timeframe until extras turn into a given factor is much shorter, because the customers are more demanding.*

*Here the demand from the retail sector and the manufacturing companies is very sophisticated. ... That puts a fair amount of pressure on the logistics operators. (Tr.) ... [W]e have to adapt to the customer demands and need to reduce their cost or improve their business processes. ... That means we have to be innovative.*

Indeed, there are many different levels of qualities related to market demand. For example, particular commodities will require constant monitoring in the whole supply chain, whereas others do not require such sophisticated observation. Then there are parts of the supply chain where the requirement of quality is not as closely related to the direct commodity, such as during the primary transport and within the gateway when using standardized transport units. However, one of the important quality criteria required by all commodities is that of reliability, irrespective of whether the demand is standardised or customised, as is demonstrated by these statements:

*Critical unique demand ... [exists] only in some parts of the supply chain. ... In the container terminal there are no unique requirements. You have to stick to the operational characteristics. ... They only think in boxes not the cargo inside.*

*What is important to the clients is reliability and logistic solutions that are tailor-made according their processes. (Tr.) ... [Be] sure that your stock can arrive at a certain date as promised which is more important than lead time. The promised delivery should be met in 95% of cases.*

It is suggested that the market companies associated with Logistics City-Clusters should be in the forefront of sophisticated demand regarding supply chain and logistics requirements. These sophisticated demands are passed on to the logistics services, requiring them to provide and develop world-class services, which are then reflected within the other functional enablers. Interviewees in Rotterdam specifically indicated that they work with the concept of 'leader firms' when talking about market quality, and insist that consequently their Logistics City-Cluster has a strong competitive advantage. It was stated:

*When it comes to demand quality, we use the concept of leader firms. ... [Y]ou would like to have the companies that require sophisticated supply chains. .... Right, because if you have those all their suppliers and logistics contractors have to reach that level too. ... If you lack those companies then you are in a weaker position as a cluster.*

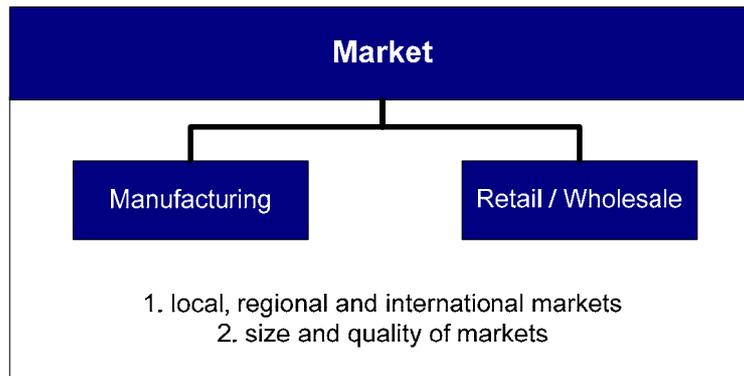
However, the market itself has not always direct demand power towards every logistics function; it also relies on the existing competition and strength of the logistics sector itself. For instance, markets commonly do not enjoy strong relationships with the operator of gateway activities. Therefore, putting pressure on these traditional functions is commonly a question of the power generated by the market on the logistics service operators and their influence on gateway activities.

#### **6.1.1.5 Concluding the 'Market' enabler**

The market enabler, the demand driver for logistics activities, is divided into manufacturing and retail/wholesale sectors. These segments intimately determine the characteristics of a Logistics City-Cluster and its functional enablers. Hence, their differences and commonalities should be reflected in the setup of the entire system (Figure 6.1-2).

Logistics City-Clusters should be connected to local, regional and global markets through trade networks. Proximate markets and cluster have a symbiotic relationship; initially, logistics activities are enabled by the demand of the local and regional markets, while logistics activities on the other hand attract further market sectors to settle in this region. Increased international connectivity on the other hand significantly expands market size and is a dominant creator of regional economic value. Therefore, the provided functional enablers, especially the services and infrastructure, should efficiently integrate these dispersed markets.

The size of markets is a key determinant in ensuring that the functional enablers are properly established and administered. For example, economy of scale allows the provision of adequate capital required for developing infrastructure and significant market size can also assure a competitive level of logistics services. It is also concluded that the demand for higher quality services by the market sectors forces the functional enablers to meet and maintain high standards. This can lead to efficient logistics services, capable connectivity of the gateways and increased technological development across the supply chain, which benefits the entire cluster.



**Figure 6.1-2: The ‘Market’ category and its properties**

## 6.1.2 Infrastructure Enabler

Although general agreement on the basic and wider contextual background of the preliminary infrastructure enabler was confirmed in Round II, it required moderate amendments. The preliminary *physical infrastructure segment* is regarded as obsolete and its sub-segments are now seen as core elements. Indeed, the sub-segments of ‘*transport*’ and ‘*international gateways*’ are now merged into the new core element of ‘**Logistics Infrastructure**’; and ‘**Social Infrastructure**’ is up-graded to a core component. Additionally, the preliminary ‘*commercial infrastructure*’ segment is now excluded, since it has a stronger relationship to other determinants, despite its infrastructural needs. The position of ‘**IT-Infrastructure**’ as a core element is acknowledged, however its properties are slightly amended. The earlier sub-segment of ‘*financial infrastructure*’ was ignored by the participants and emerged at its own enabling category as discussed later. Hence, the infrastructure enabling category is restructured into three sub-segments, which will be discussed in the following paragraphs.

### 6.1.2.1 The critical function of logistics infrastructure

The efficient movement of goods to and from markets requires streamlined physical connectivity, which translates into logistically designed infrastructure. Trade gateways, having international, regional and local functionalities, act as consolidation and deconsolidation hubs and to be competitive, sophisticated transport infrastructure is required. Notwithstanding the fact that road connectivity is an essential part of any cluster, the notion of multimodality has gained importance within the last years due to the growing emphasis on sustainability. This direction was strongly echoed by the participants:

*There is no logistics cluster without infrastructure. This includes transport infrastructure and hubs. ... For our location it is mainly the sea access that is supported by hinterland*

*transport modes such as rail, road and inland waterway transport. Multimodality is very important for our cluster.*

*Appropriate infrastructure is the foundation of logistics activities. Indeed, by that I mean the transport infrastructure and the transshipment hubs. ... As far as our maritime hub function is concerned, we have efficient sea terminals and distinct hinterland transport infrastructure such as roads, railways and waterways. (Tr.)*

Whilst all of the examined Logistics City-Clusters provide multimodal transport opportunities, there are modes that have been given pre-eminence. For instance, both Rotterdam and Hamburg focus on the maritime mode, which are favoured by geographical factors. Hence, they have the seaport as the main trade gateway connecting to distant markets, and physical developments concentrate on the adjustment of the navigation channels and the seaport infrastructure. Although Hamburg and Rotterdam emphasis maritime shipping, their hinterland connectivity differs. Rotterdam favours inland waterway transport to a greater extent than Hamburg. In a similar way, the inland cluster exploit their given circumstances; Duisburg focuses on their inland water facility due to the suitable nearby river system and Zaragoza has chosen to specialise in air and rail, since their river is not suitable for freight transportation. This has been reported by the executives:

*Rotterdam's infrastructure developments [focus on]... the maritime side. ... Our geographical advantage when comparing to Hamburg is the river hinterland transport. This river system connects efficiently to the industrial area of Germany.*

*There will come a point when the large ships cannot access the port anymore via the Elbe-River because of the draught issue. Then there are places along the river where the ships cannot pass each other because of the river's limited width. Thus, an adaptation of the navigation channel is necessary. (Tr.)*

*For us the Rhine-River and the access to the canal system is of great importance. In addition, Duisburg is very well connected to the railway centre of Oberhausen. ... And now there is also the dedicated BETUWE railway connection from Rotterdam. (Tr.)*

*The public transport high-speed train leaves more capacity for freight on the regular rail track. ... [T]he airport that has two big runways that were designed to land B52 bombers. ... [T]he size but also the latitude are perfect for a cargo airport.*

Indeed, the early recognition of a potential dominant international transport mode, based on the geographical factors, must be embedded into the core logistics infrastructure. In this context, these are the primary logistics infrastructure elements that handle high volumes of global and regional markets. However, there are also secondary infrastructure components for smaller regional and local trade. It emerged that the infrastructure focus has shifted in the last few years towards the importance of contiguous secondary infrastructure linking efficiently to the primary connectivity. According to the respondents, congestion within the secondary infrastructure is

currently one of the critical challenges facing the overall efficiency of Logistics City-Clusters. Various respondents illustrated these observations:

*The automated 'Altenwerder' terminal provides 3-4 million TEU transshipment capacity for the global commodity flow. ... Hamburg is also of importance as a regional and local node because of its good railway and road connections. (Tr.)*

*[T]hese infrastructure congestions are not so much on the port itself and its terminals but it is very much on the hinterland infrastructure.*

*France is in the process of making improvements in the area of hinterland connectivity, so that the large ships will not all go past the seaports of Le Havre and Marseille. They have recognized the weakness in hinterland transport and want to improve on that. (Tr.)*

What is appearing here is the growing insistence on an overall network that includes the major gateways and their primary transport infrastructure, but also equally considers the secondary infrastructure connecting to regional areas. Without the development of a sufficient secondary infrastructure, the whole network will be congested, which is felt negatively throughout the entire cluster. The understanding of interdependency of both primary and secondary logistics infrastructure to achieve an efficient network is critical, and was emphasised by the interviewees:

*[We were] working on a large scale research project related to the congested highway A15. We had some policy instruments but what was the effect? Well, with policy element we solved this particular challenge; however the whole network stayed congested.*

*[Our] focus is not on single infrastructure elements but towards an integrated infrastructure network. Hence, not just on the primary waterway connectivity but also on railway and road connectivity. We want many transport options in order to have an attractive holistic network. (Tr.)*

Whilst in hindsight, this might appear to be an obvious concern, the practical development of a congruent network is not an easy undertaking. First, the wider geographical area clusters involve several autonomous infrastructure authorities, making strategic oversight of physical development more difficult. Second, the infrastructure required is not bespoke; it can be utilised by both commercial freight users and for social purposes such as public transport. The tensions are hinted at in these statements:

*[Infrastructure planning] is not easy, since transport networks involve different jurisdictions. ... Hamburg can only plan for a 15 km radius, beyond that the states of Schleswig-Holstein and Niedersachsen are responsible. That not only applies to the state level but also the federal level with regard to national infrastructure. (Tr.)*

*Well, they have to plan not just for freight but also for public transport, since both depend on the same infrastructure. ... [I]f it were up to us, we would have separated cargo and public transport in the railway sector a long time ago. It would be a lot more efficient that way. (Tr.)*

It also emerged that the quality of logistics infrastructure is a critical notion. Quality is perceived as the robustness and the reliability of trade gateways and their associated transport connectivity to local, regional and international markets. Robustness was generally reflected in the interviews by the notion of size or number of the contributing physical infrastructural elements that make up the Logistics City-Cluster. However, to ensure uninterrupted flow of goods, the quality of infrastructure should also consider more abstract and subtle concerns, such as density ratings and the 'state-of-the-art'. Further it appeared that reliability of connectivity can be defined by the frequency of goods transfer from one gateway to another along the trade corridors. Respondents insisted on these notions, claiming:

*[We are] better connected with Madrid and Barcelona than with Bilbao and Valencia, in number and size both for rail and roads. ... A new highway that connects Zaragoza with Valencia has only been recently finished. ... The capacity of the possible railway connecting to France will be 40 Million tons per year.*

*For each individual mode you can start to assess their quality based on congestions, estimated travel patterns to reach destinations and the current maintenance level.*

*It's not just the number of roads, but also their quality. The quality depends on the maintenance. What is the use of having many roads if you cannot drive on them properly? (Tr.)*

In this context, the separation between the physical components and related services can be quite indistinct, since infrastructure quality factors such as the number of destinations, transport frequencies and reliability, are *de facto* related to operators. Therefore, some contributors to the perceived infrastructure quality are in the hands of service providers, which is a critical factor regarding the overall quality of Logistics City-Clusters.

One final major theme that arose in the context of logistics infrastructures and their associated facilities is the notion of land allocation. The availability of land is of great importance for the development of logistics infrastructure. Land planning for logistics associated infrastructure without any competing urban construct, certainly supports the development of Logistics City-Clusters. It allows a stronger concentration of logistics activities, which supports agglomeration effects. This ideal situation of spatial land allocation can be observed in new emerging Logistics City-Clusters. Participants stated:

*Well, providing land for logistics infrastructure is a major issue. We cannot achieve anything without land. ... We include the topic of land availability into our infrastructure planning. (Tr.)*

*You were able to plan everything from scratch, like on a drawing-board. You could allocate large parcels of land that were a perfect fit. ... We built new internal transport networks, which were then connected to international corridors. That was perfect. (Tr.)*

However, the ideal situation of unfettered land allocation does not usually occur in any historically grown cluster. This is due to the lack of sufficient space and competing interest of other urban constructs (e.g. residential or commercial developments). Land scarcity and competing interests are significant notions, since this commonly translates into higher land prices, which makes infrastructure development more expensive. These centrifugal agglomeration forces account especially for the basic logistics activities that are land intensive. Consequently, any available land and its related infrastructure needs to be used efficiently and for an appropriate purpose to justify the expenses. The interviewees emphasised:

*This area used to belong to the port. Now it is being transformed into office and apartment buildings. Certainly, this is going to be very nice. However, the land is lost for port or logistics activities. (Tr.)*

*We now have the problem that we've reached over 90% of land commercialization. ... The demand is high and that is reflected by the price. ... Certainly, a company that only sends trucks in and out will not locate here, because of the high prices. For companies such as NYK Logistics or Maersk, which have a multimodal approach, it is more suitable since they attain a higher level of value creation. (Tr.)*

The challenge for logistics infrastructure induced by land scarcity is multiplied when taking strong trade growth into consideration. An additional factor is that the implementation of new infrastructure, from the initial idea until the final development, is very time consuming. The possible imbalance of trade growth rate and time consuming implementation combined with land scarcity, can however result into a positive effect. Indeed, some informants pointed out that this forces innovative solutions that increase infrastructure productivity by improving logistics operations and implementing new technologies. Nevertheless, the senior executives mentioned that innovations are not necessarily enough to ease the pressure. The key concerns are evident in these quotes:

*Developing infrastructure is a long process. ... Let's take, for example, the current adaptation of the Elbe-River's navigation channel. This has been talked about since 2000 and yet we do not even have a project approval procedure. (Tr.)*

*We have to be innovative, since we cannot develop infrastructure that quickly. ... For instance we introduce traffic guide systems to reduce congestion or terminal automation. It is quite obvious that it is now faster and more efficient. (Tr.)*

*[W]e are now in the process of increasing existing infrastructure capacities by employing intelligent solutions. ... But these are just temporary solutions, since you simply can't solve the primary underlying capacity problem by improving the processes. (Tr.)*

### 6.1.2.2 The necessity of IT infrastructure

Whilst excellent logistics infrastructure is critical to facilitate trade, it does not always ensure efficient connectivity. The physical flow of goods has to be complemented by efficient information flow, which can be provided by appropriately designed ICT. Consequently, ICT has emerged as an essential second layer of this enabler, which encompasses the physical component (e.g. broadband) and the virtual component (e.g. software and platforms). Respondents indicated the following:

*I have to guarantee ... also the information flow. That should be first-class ICT-infrastructure that supports the physical logistic processes. For example the idea of the 'Internet of Things' by 'Fraunhofer' ... that could be a quantum leap in the development of integrated information and commodity flow. (Tr.)*

*[A]n additional layer is ICT infrastructure. [O]f course the physical component is important. ... [W]e completed a full net of optical fibre connecting all the plots. ... But, it also includes the software side ... that makes use of the physical ICT components.*

The implementation of the physical information infrastructure is costly and time consuming. Hence, appropriate long-term planning appears to be beneficial. Additionally, it is argued that the 'gold standard' of the virtual element is having an integrated information platform that brings together various stakeholders and their related systems. It is seen as a one-stop platform that uses the physical broadband connectivity to enable a seamless information transfer between all stakeholders to ease the flow of goods. The following statements were common:

*The long term planning for ICT is important since it is expensive to develop the physical component. The first question 8 years ago was about possible future services the companies require. ... Therefore, we integrated a full net of optical fibre which was very expensive, but it will be less expensive now than building it later on.*

*'DAKOSY' developed and updates the information system for the port. ... Thus, it is, so to speak, the ports' platform that enables the exchange of information between the different stakeholders participating in the transport chain, such as the terminal operators, the truck driver, the logistics service provider or the railway operator. (Tr.)*

It was found that the integration of ICT platforms in gateways is necessary because of trade growth and its related disproportionately increase in information exchange. For maximum effectiveness, gateways focus on ICT systems that allow tracking / tracing of goods, booking of time-slots and customs requirements. Due to limited resources for small companies these platforms are an attractive proposition, but these platforms encounter challenges since gateways are marginal players on global scale and have a limited influence. For example, global players provide and want to use their own information systems, which will become even more challenging since the logistics sectors is currently undergoing a consolidation process. Hence, it is understood that gateways need to allow global players to use their own information systems, otherwise

they might favour other locations. The magnitude of these issues is echoed in these comments:

*The challenge is the enormous amount of goods and the increasing trade complexity. That is why the information network of the port had to be optimized. Consequently, 'DAKOSY' was developed as a comprehensive information platform. ... Well, the platform offers the opportunity to exchange information regarding the status of transport units, or to process customs applications. (Tr.)*

*[T]he large players like Maersk have their own ICT functions. ... Those companies become even much larger. This might reduce the importance of the port's IT functions because there are not that powerful and only have regional responsibility. ... As a port you certainly play a role in IT-platforms, but you must allow the global players to use their own IT systems.*

Any potential difficulties posed by this requirement might be solved by the use of innovative 'Service Oriented Architecture' (SOA) which provides a range of technologies for gathering, storing, retrieving, processing, analysing and transmitting information. This architecture facilitates information sharing and access to the necessary data by separating technical and implementation details (Toh et al., 2008). Indeed, while ICT has a vital role as part of a competitive gateway, there is no ICT infrastructure that actually addresses the complex business environment of the Logistics City-Cluster. Therefore, the development of an integrated information platform for a cluster holds future potential, as indicated in this comment:

*Of course we have a vessel tracker system ... and DAKOSY is well known to us. But it is not like we have a central ICT logistics platform here. The 250 logistics companies located at the port have interfaces. Hence, their communication can be optimized by a central information platform. This is a project that has a future. (Tr.)*

From these observations, a one-stop information platform is becoming a crucial enabler. Important here is that it should not only focus on the trade gateway itself, but needs to be considered at the Logistics City-Cluster level.

### **6.1.2.3 The role of social infrastructure**

Social infrastructure, in the form of both hard (e.g. parks) and soft (e.g. services) elements, must be provided in response to the perceived needs of the community associated with the Logistics City-Cluster. Based on the interviews the social infrastructure can be broadly categorised as: (i) arts, culture, sport and recreation; (ii) kindergarten and education facilities; (iii) public transport and community development; and (iv) natural environment, as is evident in the following responses:

*You need decent places to live; you need theatres, movies, shopping centres, parks, recreation centres ... and public transport. ... Plaza Logistica also provides services such as a kindergarten ... and a retirement centre.*

*One factor of success is that we are a liveable city with lots of water and parks. ... [O]f course, we invest in education, childcare centres... and strengthening cultural institutions ... A second factor is that our city offers 'maritime flair'. That means a lot of recreational maritime activities and events. (Tr.)*

In parallel with the description of social infrastructure, the respondents signalled that these need to be well accessible. However, convenient accessibility depends on the nature of the need and the related time factor. For example, for a lunch break or kindergarten, access must be much closer to the actual core activities than for a theatre visit. Therefore, depending on the nature of social demand, social infrastructure needs to be accessible in a comfortable and convenient way that is tailored to its purpose. In this regard the participants suggested:

*Social infrastructure and their accessibility are very important, since we have something like a 2-3 hour 'Siesta' here in Spain. ... So we have a commercial area including shopping and restaurants right in the middle of the Plaza Logistica. ... We also have a very nice green park ... [and] areas for golf, tennis and football located in the 'Freight Village', which people can use during their 'Siesta'.*

*It is very well located and we have the Pyrenees near by for skying. Now, [due to the high-speed train], we can be in Barcelona and Madrid within 1.5 hours. The people here love it.*

Pragmatically, the intimate relationship between Logistics City-Clusters and the important role of social infrastructure is the workforce. To attract and keep the workforce and their families, adequate social infrastructure that enhances quality of life is essential. The respondents were quick to pinpoint this relationship, saying the better the social infrastructure is aligned to the core activities, the easier it is to attract and keep the necessary workforce:

*Unless you make the social infrastructure more attractive, you have difficulties to get good workforce. ... You would not think that there is a link between high-end logistics and social infrastructure, but the link happens through the people. ... [T]o make the highly educated people stay, the social infrastructure is the key.*

*Good social infrastructure and quality of life has a positive influence on being a strong logistic location, since it attracts highly skilled workforce. ... [T]hese soft factors are also called festivalization, meaning which is the most liveable and greenest city? Hamburg has understood that it must be seen as a location that is worth living and working in. (Tr.)*

It is in this context that the required social infrastructure is related to the core activities. If the main functions are more operational-oriented then the social infrastructure should be developed to meet the needs of the operational workforce. In contrast, if Logistics City-Cluster includes various head offices and more sophisticated jobs, then the social infrastructure needs to address the requirements of highly skilled workforce. From this it follows that sophisticated social infrastructure is of a critical nature and without it there will always be a challenge to attract and sustain the required workforce. It seems that there is also a link between the type of the major trade gateway and social

infrastructure. For example, a cluster that is associated with a seaport includes social attractions such as a maritime festival or maritime museum. Both notions are evident in the following quotes:

*Rotterdam is very good in operation so the social infrastructure is also based on operations. ... It is impossible to bring white collar labour, corporate HQ and decision makers if you don't have the right social infrastructure.*

*As far as image and quality of life are concerned, we don't have much to offer. ... With regard to management roles or white collar logistics jobs, Hamburg is much more attractive than our blue collar characterized Duisburg. (Tr.)*

*Hamburg's trademark is the seaport. That is revealed in the recreational activities ... that relate with the 'maritime flair'. For instance, the maritime festivals, harbour cruises, cruise vessels and the many beautiful quarters along the Elbe-River. (Tr.)*

Given these relationships, it needs to be further appreciated that the importance of social infrastructure is also a matter of the regional economic situation. In an economic downturn, it is much easier to attract a workforce and consequently social infrastructure plays a more peripheral role. However, members of a highly skilled specialised workforce will always tend to focus on the quality of social infrastructure. On the other hand, in a tight labour market a region must be attractive and the social infrastructure will shift automatically into a much more central position. This situation is well known:

*In good economic times you need to be attractive to possible employees. ... The economy goes down, then ... there are plenty of people starting to knock on our doors. ... Look how HR-departments operate. If there are not enough people, the agencies are polite. If there are plenty of people you are lucky to get a return letter. It is a matter of economy.*

Overall, social infrastructure plays a major role in the smooth functioning of a Logistics City-Cluster, despite the fact that economic situations fluctuate. As understood, the provision of good hard and soft social infrastructure that is conveniently accessible will contribute to a more stable and skilled labour force.

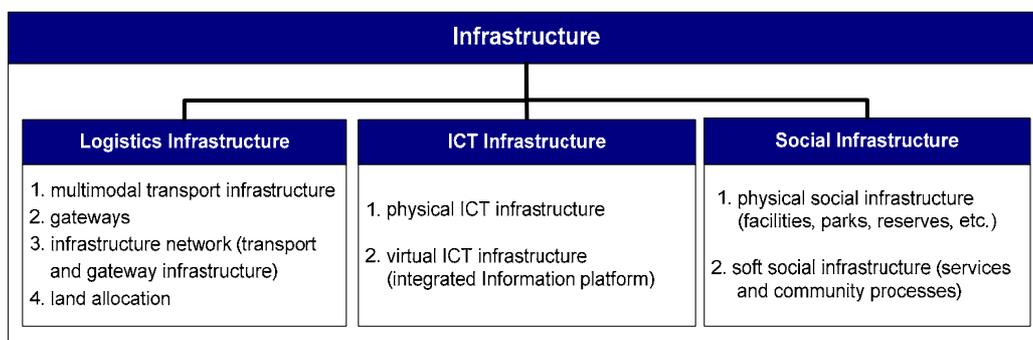
#### **6.1.2.4 Concluding the 'Infrastructure' enabler**

Logistics City-Clusters require sufficient multimodal transport and gateway infrastructures tailored for local, regional and international functionalities to enable competitive connectivity. Multi-modal infrastructure is divided into primary infrastructure and secondary infrastructure, which both should be in harmony with prevailing geographical factors. Designing the primary and secondary infrastructure as an integrated network is of great importance to achieve high efficiencies; however its actual implementation is challenging. The quality of the logistics infrastructure is determined by how robust and reliably it connects on international, regional and local levels. This can be estimated by the quantity and excellence of the infrastructure components, but also by the efficiency of the service operators.

Land allocation for the creation and extension of logistics infrastructure is a key element of this enabler. The ideal situation of spatial allocation for logistics infrastructure can be seen in an environment that has few competing urban constructs, which, however, is not common for Logistics City-Clusters. The scarcity of land, high growth rates and long infrastructure implementation times can constrain existing logistics infrastructure and inhibit further growth of the system. However, it can also force innovations to increase the utilisation of existing infrastructure capacity.

Logistics infrastructure has to be complemented by appropriate physical ICT infrastructure and its virtual elements to ensure efficient logistics operation. Certainly, the provision of physical components is costly and time consuming, but is the necessary base of the virtual component that is driven by an integrated information platform connecting all associated stakeholders. Currently, one-stop information platforms are commonly implemented in the major gateways but not at the Logistics City-Cluster level. Global logistics providers who prefer to operate their own software are challenging the existing platforms in gateways. Therefore, the use of innovative 'SOA' that separate technical and implementation details are preferred.

Social infrastructure, both in physical form and its associated services, needs to be conveniently accessible. It complements the functionalities of a Logistics City-Cluster and has a symbiotic relationship with its core activities. This is based on the social infrastructures' role to attract, develop and keep the required workforce. Further, in an economic upturn of the region, the importance of social infrastructure shifts into a more central position for retaining the workforce, whereas in an economic downturn its role becomes more peripheral. The emerged three sub-elements of the 'Infrastructure' enabler and their properties are drawn together in Figure 6.1-3.



**Figure 6.1-3: The 'Infrastructure' category and its properties**

### 6.1.3 Service Enabler

As described, the *social services* are now included in the social infrastructure category; hence it is now excluded from the service enabler. Further it emerged fairly early that the *logistics activities* can be more conveniently differentiated into **lower and higher value-add logistics services**. The category of the *value-add business services* were slightly amended and now only consider activities that are needed to provide appropriate support to the logistics processes. They are now referred to as **supporting activities**. Consequently, the elaborated concept of the 'Service' enabler contains only the emerged logistics core and supporting activities, which will be described in the following paragraphs, including their *importance for the region*.

#### 6.1.3.1 The lower and higher value-add logistics activities

Although the general consensus is that the core activities are all directly related to logistics value-add services, it became apparent that there are differing perspectives. As described in the elaborated definitional conception, there is a distinction between the logistics services which relate to the different levels of value-add functionalities. Before going into more detail, it is convenient to make a brief discourse on the notions of value-add. It was claimed by the interviewees that logistics activities provide additional value-add services to meet or exceed customer requirements, which significantly reduces supply chain costs and contributes to measurable gains in competitive advantage in the marketplace. Hence, it is in this context that logistics is now becoming explicitly understood as a value-add activity. The interviewees argued:

*Logistics companies can lower the costs for manufacturing companies and of crucial importance is that they simply react faster to market changes. ... They can also offer support when expanding to new markets. (Tr.)*

*Logistics is the competitive weapon for the companies in Europe. Right now we can't compete in the labour costs. So we have to try to compete through the logistics sector. What this means is to be reliable and to respond quicker when changes are needed. This is creating value for the business.*

However, there was a reflection in the interviews that many respondents did not have a formal definition of logistics value-add and were a long way from developing a sophisticated understanding. Commonly, the respondents referred to logistics services as value-add activities, but did not clearly define the term value and how logistics activities can be separated in terms of their value-add levels. Only few informants enabled a better insight when associating value-add of logistics activities per unit of turnover, as contained in this quote:

*Value-adding is produced in all ... logistics segments; however it differs in the amount. ... One Euro of turnover realises a value-add of 1.5 cents in the seaport transit function.*

*Then you have the function related to the value-add-services in distribution centres. There it was around 10 cent per Euro.*

Despite the lack of an absolute definition, it is concluded that the core activities of a Logistics City-Cluster can be conveniently separated in two layers; the lower and the higher logistics value-add activities. Regarding this segmentation, respondents perceived that the lower logistics value-added services are associated with transshipment, transport, storage and simple warehousing. It was noted:

*Just ordinary transport is the least interested in value-add. ... I further think that simple storage, consolidation, deconsolidation and shipping are on [the] lower [end] of value-add. ... We have toy and textile companies just doing simple warehouse and distributing activities, but those are just simple value-add activities.*

*The maritime transport links from here to England or Scandinavia are very important. So is the loading and unloading of containers ... You need all that, but with regard to regional creation of value-add it is not as important. (Tr.)*

Indeed, the trade gateway is shaping the characteristics and the setup of the identified lower value-add activities. For example, the basic operational transshipment activities for a rail terminal will be different to a sea terminal, which certainly accounts for the related transport activity. Of significant importance is that the lower value-add activities are perceived as one-dimensional, meaning that operators focus on few activities such as a particular transport mode to reduce costs through economy of scale and standardised processes. These services relate to non-tailored activities and are associated with lower switching costs. It further appeared that these basic services have a strong influence on the characteristics of the higher logistics value-add activities and supporting industries. An example is ship financing or the maintenance of vessels that are commonly tied to a seaport. The following comments exemplify these understandings:

*The lower value-add logistics activities are ... the basic functions, which are standardised and very cost driven. Therefore, you need a critical mass to achieve lower costs.*

*Because we operate rail shuttles, we understand this business ... on all levels. ... That is why we have been able to expand our network to a great degree in the proximate region ... but also internationally. ... Through standardization and sufficient mass of cargo we are able to keep the costs low. We have to do that, otherwise the freight moves to trucks or other rail operators. (Tr.)*

*Without the port, the shipping companies and the world's largest ship financing enterprises would not have established here. (Tr.)*

However, it is the presence of higher logistics value-add activities that are essential. The participants argued that without a critical amount of higher value-added services there is no Logistics City-Cluster, just another basic trade gateway. Nevertheless, it emerged that the trade gateway infrastructure and their associated basic services are a

prerequisite to enable high value-add logistics services. The participants stated that the attraction of high value-add activities is grounded in transshipment and distribution functions and are the core to stimulated economic growth, as articulated in following comments:

*The true source for economic power would come if the transport nodes and their basic services attract the next level of value-add services. ... The logic ... is [that] those attract higher value-add services such as light assembly, customizing activities. ... [and] logistics decision making. ... You actually saw it happen in Singapore.*

*After all, it is the commodity flow and the transport hubs that enable the settlement of light manufacturing processes. The functionalities of transshipment and distribution are the basis for the regional light assembly. ... That is where the real value-add is created. (Tr.)*

The type of higher value-add logistics activities are identified as light assembly, customizing, quality control and specialised packaging. These perceptions of the participants are consistent with the definition of value-add related to the manufacturing process, which is taken as the additional value given to a commodity in excess of the cost used to process it. Further, it was found that logistics strategic functions such as supply chain management and decision making in corporate headquarters (HQ) are perceived as logistics higher value-add activities. The following three quotes are just a small sample of the statements given:

*We have different languages ... and although power plugs in Europe. There are a lot of ... differences ... so products come in and made country or client specific. We call that high value customizing. ... Additionally, we perform value adds operation like quality control and packaging.*

*'Logistics Clusters' are really driven by ... supply chain capabilities and logistics design functionalities. ... Clearly, high value logistics activities are related to strategic decision making and logistics HQs.*

*The goods come from overseas and are then order-picked, wrapped and labelled again etc. That is part and parcel of logistics nowadays. Panalpina for example order-picks and further processes clothing from China. ... Or Phillips, their medical equipment is distributed by a LSP who also installs it in the doctors' surgeries and is in charge of minor repairs. (Tr.)*

Many of these higher value-add functions are strongly linked to the import of goods. This is because they are naturally located closer to their actual destination, so that customizing for the market specific demands is more economical. Higher value-add activities are not seen as standardised but tailor made to customer requirements. Most important in this regard is that these high value-add activities are more complex and have multi-dimensional functionalities that combine different activities. These core understandings are illustrated by following observation:

*Kuehne & Nagel ... manage the supply chain for HP's printer cartridges. They come from Asia ... into the warehouse here and are packed into reusable containers. Later they are*

*taken out again, put on the assembly line by robots, get wrapped, labelled and provided with a safety sticker. (Tr.)*

*Harms manage supply chains in the automotive sector. [For instance] Skodas from the Czech Republic or Renaults from France arrive by rail and are then cleaned in car washing facilities. Then customising takes place, such as the assembly of special wheel rims or navigation systems. The cars are finalised according to customers' specifications, before being distributed to the final destination. (Tr.)*

Despite the strong arguments for the interrelationship of both value-add levels, it must be noted that not all higher value-add services are necessarily linked to the basic activities and logistics infrastructures. Supply chain design centres and HQ do not need to be located in close proximity to basic operational functions, but can have stronger correlation to other enabling elements such as social infrastructure.

Finally, it appeared that due to the evolution of logistics as a competitive business tool and its value-add functionality, logistics functions have started to be outsourced from the market segments. Whereas lower value-add logistics services have been operated independently fairly early, the outsourcing of higher value-add activities has emerged only in the last two decades, forced by the increasing complexity of supply chains. These notions were addressed in following statements:

*Tailored cost-effective logistic solutions, that is what clients demand and this is one reason why logistics is outsourced in many cases. Logistics companies are now not only in charge of delivering spare parts but also for their assembly or installation. That means direct value-add services are provided by logistics companies. (Tr.)*

*Well, the traditional logistic tasks were taken over by specialists early on. However, some studies say that only 30% of all high value logistic activities have been outsourced. There is still a lot of potential in the area of contract logistics. (Tr.)*

Although a number of logistics activities have been outsourced to entities that solely focus on single or multiple logistics services, there are still various logistics activities kept in-house by the market segments due to perceived threats such as loss of control. Nevertheless, the critical notion introduced here is that both pure LSP, as well as the in-house logistics activities of any other firms, are considered in the context of Logistics City-Clusters.

### **6.1.3.2 The role of services supporting logistics activities**

The nature of the supporting industries depended somewhat on the perceived Logistics City-Cluster core activities and can be understood differently. For instance, one participant stated that only high value-added logistics services should be seen as the core, and therefore perceived the lower logistics value-added services as supporting services. On a micro perspective, one participant argued that driver and forklift are not

seen as a core element of the warehouse. By declaring this as 'supporting resources', it follows that it should be provided by other industries. This is an important demonstration of the complexity of the ideas which has been dealt with, as indicated:

*Only the higher value logistics activities are the core. Therefore, the most obvious supporting ones are the hauliers, freight forwarders and container handlers.*

*[S]tick to you core business, so outsource everything that is not the core. ... [F]or instance we don't really need all workers on our payroll, only a few to maintain the core processes. ... We need flexibility. We don't need owning the forklift. We want a forklift and its driver when we need it. So please rent us a forklift including a driver.*

Hence, there are many definitional positions beyond that of determining the core and support services, such as outsourcing policy or logistics strategies. The main consequence from this discussion is the importance of clear definitional borders for core activities and supporting industries. Considering that the core activities are the lower and higher value logistics services, it appears that all types of services demanded by those can be subsumed as supporting activities. Respondents suggested these as ICT, advertising and 'Public Relations' (PR), maintenance activities, engineering and architectural services, as well as banking, finance and insurance. They noted:

*ICT, engineering companies, architects, then advertising and PR, banking, insurance that is really important for logistics companies. ... Within the 'Freight Village' there are companies that offer container cleaning and truck maintenance services.*

*These are providers of financial services and tax accountants. Then there are IT providers, the 'Germanische Lloyd' ... and the issue of warehouse equipment. The support services play a critical role in the logistic system. (Tr.)*

Beside those activities, there are additional services such as accounting and legal support, leasing of equipment, research and consultancies, recruitment agencies and education providers. These are considered as important sectors that are demanded by the logistics area, as argued by the participants:

*Specialised supply chain consultancy and R&D services. Also temp agencies, education providers ... [and] second-hand hiring of equipment are demanded by logistics companies. [Additionally] accounting and legal support are very important.*

*There are many companies in the area which perform outsourced management for logistics companies such as for leasing containers and trailers, workforce recruitment ... or legal issues. (Tr.)*

Clearly, the presence of supporting industry is needed for the efficient operation of logistics activities. Various sectors and their activities have direct linkages to lower and higher value logistics services and therefore should be easily accessible. This leads naturally to a co-location of supporting and logistics services. It was further argued that the existence of a strong suite of supporting activities will create potential advantages

for the logistics industry. This is the case especially when the supporting activities are on a sophisticated and international competitive level. The respondents noted:

*In the north we have ... companies providing IT and warehouses technology for the logistics operators. ... We also have a little business district for insurances, banking and other business activities integrated in Plaza Logistica.*

*Service providers such as security, recruitment or customs agencies are now locating here and complete the port package. ... When we were handling 100.000 TEU, there was only one customs agency. Today we have 5 agencies and 900.000 TEU. It's the same regarding the number of recruitment agencies. (Tr.)*

Interestingly, another level of complexity in the area of supporting services was found in the notion of competition. It appeared that supporting industry, particularly if it is located in an established metropolitan area, competes with the logistics industry regarding other functional enablers such as workforce or scarce land.

### **6.1.3.3 The importance of logistics activities in a region**

As found in the literature review, the geographical grouping of independent logistics activities is perceived as a localisation agglomeration. This agglomeration generates benefits such as cost reductions, labour pooling and accelerated innovations. This notion was widely supported in the interviews and is represented by this quote:

*In recent years, the container flows have more than tripled. ... This makes the railway operation economically viable in the first place. The quantity of freight allows lower costs. ... The more connections and higher frequency we can offer as a node, the more freight is attracted, which again results in lower costs per unit. Clearly, you can refer to it as a strong pull effect. (Tr.)*

Logistics concentration has also a strong interdependency with urbanisation and activity-complex economies by attracting unlike companies that share specialised business services and infrastructure, such as the supporting activities in a 'Logistics Village' or market segments companies. The essence of this discussion is that a critical mass of logistics activities will lead to increased potential for growth by attracting unlike activities due to the advantages of agglomeration. These notions are evident in following comments:

*International companies took the decision not to come here because there was no real development, just plans on paper. ... In the beginning we could only attract regional companies. ... International companies such as Siemens-Bosch only decided to build a huge distribution centre after most of the development was finished and regional companies had settled.*

*The fact alone that we have a world leading seaport creates agglomeration effects. ... The critical mass of logistics companies ... and the qualitative infrastructure make a big difference. Once a cluster exists, traditions and expertise develop. ... And then all want to come here to be part of the success. (Tr.)*

To ensure a better understanding of the logistics sector's concentration and its associated growth rate in a region, there is a need for indicators. This notion, as described in the 'Market' category, suggests that the number of world class companies, headquarters and employment figures are essential. However, generally, the composition of the regional GDP indicating the economy's specialisation is the most favoured. These indicators are discussed by the participants:

*[T]he percentage of the GDP ... is the most favoured measure to see how strong the logistic sector is in the region.*

*We measured the logistics sector as well, but with a completely different method. We took the number of LSP and their employees who have to pay compulsory social security contributions as a basis and derived similar results. (Tr.)*

*Here, Kuehne & Nagel located one of their most important branches and SSB-Cargo has set up the German headquarters. ... What I really want to say is that top logistics companies have to be here. (Tr.)*

GDP is a convenient indicator; but it became apparent that the percentage of the logistics activities of the total GDP must be put into perspective. Firstly, regions must be compared in order to define a logistics specification rather than entire nations. Secondly, the major portion of the GDP is always related to basic functions of an economy, such as retail, agriculture and finance. The importance of this relation is that figures can be skewed if they are related to the incorrect level. These two concerns were reinforced by these comments:

*The logistics sector amounts to 12% of the GDP in Hamburg. The nationwide average, however, is 6%. ... Logistics is a core sector, but Hamburg is also strong in other economic aspects, since there is always a connection to regional retail and manufacturing activities. (Tr.)*

*The percentage of the port related activities is around 18% of the GDP. What you have to keep in mind is that every region consists of about 70% of local economic activities like hospital, shops, banks and partly agriculture. ... [S]o the 30% constitute the economic specialisation. So you may think 18% is not a lot. Well it is hell of a lot; it is 18 out of 30.*

Third, within the logistics sector, strength and growth can vary. Hence, a solid understanding of the different logistics segments is important when preparing the direction for Logistics City-Clusters. For example, at the time of the interviews the higher value-add logistics activities have grown faster than the transport sector. Fourth, the interviewees perceive that the technique to measure the strength of the logistics sector is difficult, because the designations of logistics services are not clearly defined. The following comments reinforce these concerns:

*The growth rates of the logistics sector are somewhere between 6-8%. This is above the general average. But then again, you have to be careful here. ... [W]ithin the industry, there are differences. ... The contract logistics sector grows around 10-15% and the transport sector only around 2%. (Tr.)*

*It is quite hard to separate logistics activities from other industry sectors. Because some logistics activities are still in-house and not outsourced. ... So it is to some extent a definitional question. ... [Y]ou have to analyse sectors and break the activities into clear industry codes.*

Despite these challenges, it is perceived that the strength of the logistics sector can be usefully measured when carefully appreciating all discussed factors. If a region has a solid base and sufficient growth rates in the logistics industry, agglomeration forces reveal their benefits, suggesting that investment in education, research and infrastructure should be focused.

#### **6.1.3.4 Concluding the 'Service' enabler**

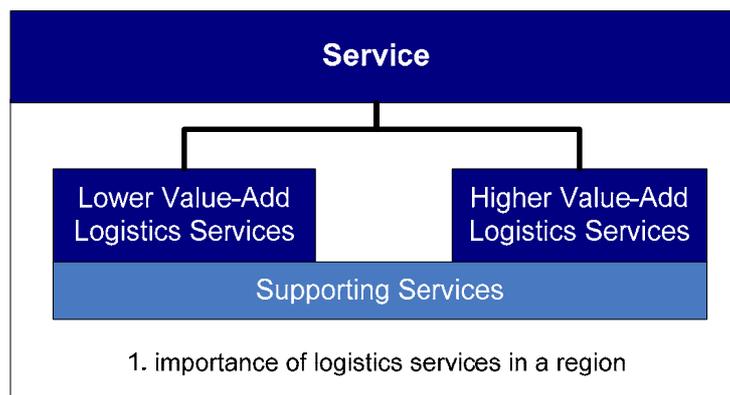
Although there is a lack of an undisputable understanding that defines value-add in regards to logistics, it is generally agreed that the intensity levels can be segmented into lower and higher logistics value-add activities. Lower value-add activities are seen as transshipment, transport and simple storage/warehouse operations. They commonly trigger and define the character of the higher logistics value services and supporting activities. In this context, higher value-add services are perceived as light assembly, customizing, quality control and packaging activities executed in warehouses or distribution centres. These have a stronger linkage to the import of goods and are located in close proximity to the final market demands to enable quicker response times. Additionally, supply chain management and logistics head office activities are part of this segment. They may not necessarily have a direct linkage to a gateway or transport function, but rather to other functional enablers such as social infrastructure.

Due to the increased complexity and importance of logistics, its operations are being outsourced from the market segments to entities that purely focus on single or multiple logistics services. This is generally to achieve economic advantages such as lower costs. In the context of Logistics City-Clusters, both pure logistics service providers and in-house logistics activities are seen as the core activities.

All types of activities demanded by the logistics services can be categorised as supporting activities to enable efficient overall operations. These consist of a variety of professional business and technical services. Although, the naturally establishment of supporting services in close proximity to logistics services is common, it needs to be ensured that they are accessible and compatible. Important is also that these are on a competitive level, since this will create potential advantages for the logistics industry.

The concentration of logistics and their supporting activities will provide agglomeration benefits, which are further strengthened by robust urban constructs such as social infrastructures. To enable a region to understand the importance of the logistics industry, the number of world class companies, headquarters, employment figures and the composition of the regional GDP need to be considered.

The core elements of the ‘Service’ enabler and the general properties are illustrated in following Figure 6.1-4.



**Figure 6.1-4: The ‘Service’ category and its properties**

### 6.1.4 Workforce Enabler

The role of a skilled workforce has appeared as an important enabler in the preliminary model. The relationship between skilled workforce and social infrastructure, both in keeping and attracting the labour, was identified and is strengthened in this iteration. However, it appeared that this preliminary enabler was too narrowly described by only focusing on skilled workforce. It emerged that there is a much wider segmentation that includes **semi- and unskilled labour**, with a tendency towards **skilled workforce**, and **highly skilled employees**. Regarding these segmentations the *importance of education* and the *challenges of recruiting appropriate workforce* will be discussed. Also the *coverage of workforce demand* and the *conception of workforce proximity* are elaborated in the next paragraphs.

#### 6.1.4.1 Segmentation of workforce

It is essential to classify the workforce into two groups, namely the unskilled/semiskilled and the highly skilled workforce. The nature of the two segments is based on their qualification and their role within the Logistics City-Cluster. Currently, the major employment group is related to basic functions such as truck drivers, stevedores,

storeman, pickers and packers, and therefore is within the unskilled/semiskilled category. These ideas are evident in such comments as:

*[T]here is a high end and a low end labour market. De facto ... as the Germans did. They thought not everyone can ... have a five year degree or a PhD. You need a system that has workforces on all levels, from soldiers, captains to generals. Especially for the logistics sector you need a good apprenticeship for the majority of the jobs.*

*There is a large untrained labour force associated with the terminals and warehouses. [T]hese make up a large component of the workforce. ... Additionally, there is the other end of the logistics workforce, which relates to the management, administration and IT sector. (Tr.)*

The importance of making this classification is related to the provision of appropriate education, since there are different levels of knowledge required. Hence, the education needed for the unskilled/semiskilled level requires a different approach and intensity than for the highly skilled sector. In the opinion of the respondents, those employees who are involved in the unskilled/semiskilled tasks do not need complex and costly training that is characteristic of tertiary education. However, what is required is a rigorous course of training, such as vocational education. These need to be provided in a way that the individual workers can exploit their maximum potential. In this regard, informants revealed:

*For ... people working in the warehouse or as a forklift driver, special schools have opened here. ... The training and education does not need to be long to provide the right employees for these activities.*

*The dual apprenticeship system ... is a very important element for many logistics tasks. ... In addition to that there is an abundance of opportunities for further vocational training and retraining. You can achieve a lot with these measures in the blue collar sector. (Tr.)*

At the administrative, planning and managerial levels of logistics activities there is a critical need for highly skilled workforce that has received appropriate graduate education. It appeared that all participating clusters have developed higher education course that specialise on logistics. Whilst the education for the highly skilled workforce is much more time consuming and costly, it is fundamental for the efficient operation and future development of the cluster, since innovation and major decisions are made by this segment. Hence, the quality of the education must be at the highest level. These notions were clearly demonstrated:

*The logistics business education takes place at the University of Hamburg. Then there is a University for Applied Sciences ... who offers logistics Master's and Bachelor degrees. ... The graduates are sought after by the industry and are appointed to highly qualified roles. (Tr.)*

*We now offer two logistics Masters-Courses. One is ... related to the MIT in Boston; educating the generals for tomorrow ... The other is coordinated by the University of Zaragoza and is for the middle ranks. ... [T]he presence of ... graduate education is*

*beneficial ... since there is a direct correlation with the positive regional development ... [that] is built over decades not in two years.*

Of particular interest is the observation that there has been a shift in the workforce tradition. The percentage of traditional unskilled labour functions in the logistics industry is lessening, and more specialised and trained workforce is required. This subtle separation of the workforce seems to merge now into a 'skilled' category. This trend underscores the need for the expansion and amendment of the educational system to provide higher vocational training, professional development and occupational retraining. Hence, when developing a cluster that aims to keep pace with world best practice, education and training contents must be reviewed regularly and adapted to current needs. It must be available to all members in an affordable way and should never be left to chance if the Logistics City-Cluster wants to prosper. In the view of the respondents:

*[T]here was a break in the labour tradition. ... Traditional labour function in seaports like the guys with very heavy loads on their backs is past. Now you have the container operator with his joystick.*

*[I]n the blue collar sector ... more and more specialist knowledge is required ... which needs to be addressed by qualified training courses. ... For instance, training for using the latest technology. ... A few years ago, a new apprenticeship was developed, the so-called logistics business manager. In addition, the freight forwarder apprenticeship was updated. (Tr.)*

Despite the ongoing shift of labour tradition due to the ongoing technological or process changes, of final importance here is that the unskilled / semiskilled workforce will have an essential role in the future needs of the logistics industry. Respondents insisted that this change, inevitable as it is, will be relatively slow and not as radical as some have predicted. It was argued:

*The tendency is towards more highly skilled jobs ... due to the increase in complexity and automation. ... However, both segments will be needed in the future.*

*Nowadays only ten people manage the loading and unloading of vessels in the terminal. The same trend is occurring in automated high-bay warehouses. Nevertheless, the blue collar sector will continue to dominate. ... A shift in the 2/3 blue colour and 1/3 white colour ratio will not be as strong. ... Managing commodity flow does not take up as many jobs as driving trucks and warehousing. (Tr.)*

Having this caveat in mind, it is apparent that, in terms of the future development of the unskilled/semiskilled and the highly skilled workforce, changes must be planned for. It is of great importance to understand the nature of workforce, since recruiting, training and retention need to be tailored to the imperatives of each activity.

#### 6.1.4.2 Challenges of recruiting appropriate workforce

While it is accepted that robust recruitment in both workforce segments is fundamental, attraction of the appropriate labour in competitive services oriented regions can be challenging. The constant competition for all levels of labour can lead to workforce scarcity for the core activities, having a negative impact on the cluster. At a more specific level, the interviewees in Hamburg and Rotterdam also indicated that the scarcity at the moment lies within the unskilled/semiskilled segment. Of particular interest are the reasons for having on-going workforce shortage. Rotterdam and Hamburg offer attractive white-collar service jobs; hence the basic logistics jobs are not highly sought after, since logistics is still perceived as a dirty and physical demanding job with limited career possibilities. The participants stated:

*[T]he scarcity at the moment is more the low end ... because of the competition with jobs that are less physical and not as dirty. The romantic picture of a trucker making trips to all of Europe does not exist anymore. People don't want to go away for many days. ... It does require a tough mentality. ... You must compete with all kind of jobs in the white colour service sector.*

*It's not as if there is no unemployment in Hamburg. ... However, recruiting blue collar workers is challenging. ... The problem here is the image of the logistics sector. ... People always say that logistics is just unskilled and hard labour, which is not well paid. (Tr.)*

The last comment indicates another disadvantage, which is associated with the monetary reward for the occupations. It is perceived by the general public that only the specialised blue colour jobs or highly skilled positions (e.g. gantry crane operator or supply chain manager) are well rewarded. However, the perception of the general public has to be put in perspective. There are low paid occupations, but it appears that the payment compared to other service-oriented industries is fairly good when compared to the required education. Therefore, it is the hard and dirty work, long hours and the bad image that reduces interest. These ideas were indicated by the respondents:

*The public employment agencies say that there enough people available. But they don't want the jobs, because they think that the wages are too low, compared to the physical hard work. ... However, if you contrast the wages with the education level needed, the payment is not as bad. (Tr.)*

*[T]he container operator with his joystick earning 100.000 a year. ... Also simple stevedores have an income up to 70.000. ... Yes you work longer hours and night shifts, but you earn much more then the office worker.*

By contrast, other clusters only lack highly skilled labour. In this situation the availability of unskilled/semiskilled labour is seen in the lower competition with other service sector and the positive attitude towards basic logistics activities due to earlier and now declining industrial economic foundations. The reason for the scarcity of highly skilled

workforce is commonly linked to unattractive social infrastructure and to the lack of specific high level logistics education. Regarding these notions it was reported:

*[T]he unemployment level is high and the competition to other white colour services is low. ... Therefore, it is not hard to attract blue collar labour. ... [In] the high end [sector] we have problems, because they may find Hamburg or London more attractive in terms of living quality.*

*It is looking good for the blue collar sector ... because more mines are closing [and] steel works are cutting jobs. ... These workers are used to hard labour, so they have no problem with logistics. An area where we have some challenges is the highly qualified sector, mainly because this location is not very attractive regarding life quality. (Tr.)*

*[G]ood workforce was always difficult get. It was not less difficult a few years ago. Maybe you could choose out of more people but the quality was the same. This is strongly linked to the missing education and training.*

Whilst there is either strength of the unskilled/semiskilled or high skilled workforce, an ideal cluster should have a balance of both segments. Certainly, a Logistics City-Cluster that is only performing well in one workforce segment runs the risk in underperforming long term.

#### **6.1.4.3 Demand coverage of required workforce**

Since the labour market is tight and slightly imbalanced in the clusters, it became apparent that there are strategies to tackle these challenges. Logistics is perceived as a hard and dirty job; therefore it was not surprising that one major focus is to improve this image. In this respect, marketing events such as presentations at local high schools or positive media coverage play an important role. Those events inform the public about the tasks of logistics and its current importance. The aim is to increase the attractiveness of the logistics sector as an employment option, as evident in the following quotes:

*The 'Logistics Day' last week was held in Germany for the first time. In many cities, there was a job and career fair in which many logistics companies and educational institutions participated. ... We educate the public about logistics and provide schools and universities with information leaflets. ... This is good for the industry in order to recruit qualified workforce. (Tr.)*

*We initiated the project 'Learn Logistics in Hamburg'. As part of this we presented all training opportunities on one website. ... We also developed a computer game, which we distributed nationwide, just to draw young people's attention to logistics career opportunities in a playful manner. (Tr.)*

As indicated, it is of great importance that any marketing efforts must be linked with explicit information about possible education and career prospect. The first reason is that the possible workforce needs to understand the opportunities that the logistics sector offers before making a decision. Secondly, just attracting people by increasing the image of the sector will not lead automatically to qualified workforce. In this regard,

platforms to exchange needs and ideas in the area of workforce education combined with the actual implementation and execution of professional training are critical. Respondents urged:

*[B]oth the education on the vocational level ... but also [at] the University level needs to be good. ... Therefore, we created a private-government partnership ... which ... has networking capabilities and they create legitimacy so to say for possible education and marketing projects.*

*Often medium-sized and also large companies ... do a lot in the area of training and vocational qualifications. Of course they're collaborating with the education providers and get support from the government. ... The goal is to have sufficient well-trained staff. (Tr.)*

Despite the fact that the scarcity of highly skilled labour is harder to overcome, two actions are observed. First, there is a focus on the development of appropriate social infrastructure to attract personnel with the right skills. Second, the introduction of sufficient tertiary education facilities to reduce the scarcity of highly skilled labour is seen as a strategic element. It must be noted that these activities will not be successful in the short term, since the development of infrastructure and tertiary education are time consuming. This contrasts with the case of unskilled / semiskilled labour where shortages can be addressed much quicker by changing regulations and introducing short courses. These are some perceptions supporting these notions:

*Social infrastructure ... [such as] decent places to live ... and theatres, those are the biggest challenges here to attract and keep the educated labour. It is a lot better then it used to be since we continuously increase the standard of living.*

*It became obvious that we need well educated staff for the middle segment during the coming years. Hence, we founded the Kuehne School of Logistics. ... But also the Hamburg School of Business Administration was established ... which offers logistics management course. (Tr.)*

*There are short and long-term education initiatives. ... Short-term there is re-training or advanced vocational training. ... Long-term the focus is on the development of educational institutions and tertiary education. It is critical to find out what the companies need now and in the future ... so that the right measures are initiated early on. (Tr.)*

Hence, appropriate mid and long term planning of the workforce education and coordinated actions are necessary to overcome current and future possible shortages of good qualified labour in both segments.

#### **6.1.4.4 Proximity of workforce**

A final observation was that the workforce should be geographically proximate to the cluster. Whilst close proximity is described as an ideal situation, there is a relationship with the economic situation. For example, in a tight labour market, which indicates a good economic situation, there is a strong focus on the proximity of the workplace, but

in times of economic downturn the workforce will travel longer distances in order to be employed. These are suggestions along these lines:

*[L]abour needs to be available in the vicinity of the activity. ... Some are not perfectly located, because there are too far away from where the people live.*

*The locals don't want to work in DCs, so those are operated by Polish workers that come here. In Poland they are using people from the Ukraine and Russia. It's a matter of economic benefits.*

The utilization of foreign labour, however, needs to be supported by regulations. The European labour market, for example, is very liberal due to the regulations by the European Union, which emphasise the widening of proximity levels. These laws allow disadvantaged members of the workforce, for example due to lower payment or inadequate level of employment possibility, to work in different countries. In this context, one participating cluster has been a net exporter of skilled labour due to lower income and unattractive social infrastructure. However, this is also seen as a future opportunity, since economic situations are dynamic and the majority of people are attached to their region. It is stated:

*Our government has decided that new EU people are allowed to work here, as long as they get paid to our standards. ... So we have blue collar workforce from all over Europe.*

*This has been a net exporter of people. A lot of people that graduate here left the place ... because the salaries do not really reflect their capabilities. ... However, they are attached to their city. ... [W]hen you have well educated people who actually don't want to leave, then you have a great opportunity of a positive long term feedback.*

Although importing workforce will reduce labour scarcity, it is more suitable to have proximate workforce. Indeed, the reliance on imported labour will mean that there is always an implicit threat in better economic times where the workforce are more likely to leave due to the low regional bond. The development of a dedicated workforce from the region, with stability of housing and social amenities, will enable a Logistics City-Cluster to withstand attacks on their labour force from other areas.

#### **6.1.4.5 Concluding the 'Workforce' enabler**

The workforce can be divided into unskilled/semiskilled and highly skilled segments both of which require education and training that is specifically aligned to their tasks. Currently, the major employment group is the unskilled/semiskilled workforce; however there is an ongoing shift in the labour tradition that is introducing a more skilled workforce. This is perceived as relatively slow and not as strong as in other sectors.

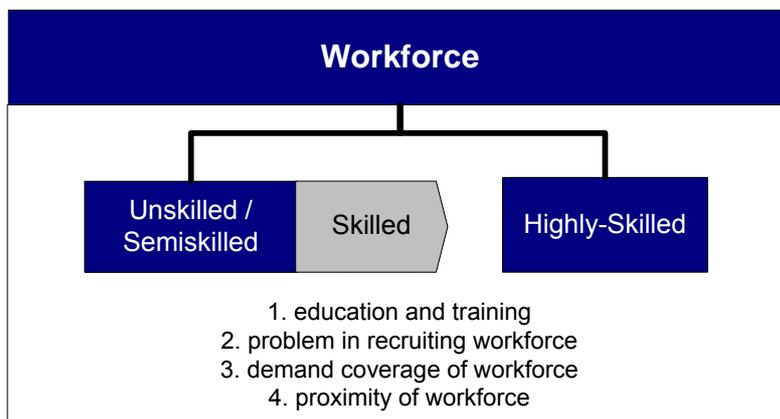
Logistics City-Clusters co-exist in thriving competitive service-oriented metropolitan areas and have challenges in attracting an appropriate workforce. The scarcity in the

unskilled/semiskilled sector is commonly associated with the poor reputation of the logistics sector, especially when considering the competitive environment of attractive white-collar service jobs. The scarcity of highly skilled workforce is mainly linked to unattractive quality of life and to the lack of appropriate education.

There are various strategies to tackle the imbalance of the workforce. Its bad image can be addressed by marketing tools, which should be complemented by education and career opportunities. Hence, to reduce immediate lack of workforce and to ensure sustainable workforce in the future, the provision of education and training facilities for both workforce segments is critical. Further, the provision of appropriate social infrastructure can reduce workforce attrition.

The development of a Logistics City-Cluster is favoured when the workforce is educated and attracted from the proximate area, since it is a commercially and strategically advantageous situation. The notion of proximity, however, is influenced by the economic situations and the social infrastructure. Hence, to attract workforce from close proximity is not always achievable, which can lead to the necessary importation of workforce.

The sub fragmentation and the major properties of the 'Workforce' enabler are indicated Figure 6.1-5.



**Figure 6.1-5: The 'Workforce' category and its properties**

### 6.1.5 Knowledge Enabler

Logistic knowledge creation was integrated in the preliminary model within the social infrastructure enabler. In Round II the *role of knowledge generation* has also appeared to be of high level importance, since it will supply the cluster with skills and innovations to remain competitive. Due to its significance, it was decided that knowledge creation

should be granted its own enabler category. What is apparent is that logistics knowledge generation is mainly based on **engineering sciences** and **economic sciences**. It emerged that knowledge can be generated by recourse to theoretical models based upon empirical studies carried out by public research platforms. However, essential knowledge can also be acquired through on-the-job experience by an individual's intuitive insight born of many years involvement. In this regards, the *involvement of the industry and the public sector in knowledge creation* emerged as an important element, which also implies a possible *collaboration* that benefits the innovation process. The following discussions will report on these major perspectives.

#### **6.1.5.1 The role of knowledge creation**

Historically, logistics emerged from complex military systems in which it is referred to the timely provision of material required for all synchronous phases of an operation. Logistics is now adopted in industry and its implication of timely provision of services is still a key attribute. However, because logistics as an industry sector has not got a long history, systematic knowledge generation through tertiary education, dedicated research activities have only emerged in the last decades. Interestingly, the importance of knowledge generation in the logistics sector is still somewhat contested and some respondents feel that innovation is of little importance. It was noted that:

*The studies and the universities for the logistic sector, that only exists for the last 20 years. ... [Knowledge centres emerged], but it is not at the scale where it should be. ... I think logistics is one of the less researched areas.*

*The area of logistics research ... has only emerged in recent years. ... Fraunhofer is one of the few and they are very industry-oriented. [T]he entire area of scientific theory at the university level is still somewhat in need of development. (Tr.)*

*I think research for logistics is a bit exaggerated. ... The majority of functions are not very knowledge driven ... and are repetitive skills. I think the knowledge intensity is very low. ... Logistics research is necessary, but not in its discussed size.*

In this regard, it must be appreciated that the importance of knowledge generation varies within different industry sectors. Certainly, logistics as a service industry is not as research extensive as other industries, such as the chemical sector. This has been investigated in more detail by Wagner (2008) and also supported by our findings, as is evident in this quote:

*[T]he chemical industry always has very large research laboratories, or for example Unilever in Rotterdam employing hundreds of researchers. Firms like Shell; they have a very large research centre here too. Compare that to the knowledge intensities of the logistics industry. Well, you cannot.*

In contrast to the somewhat dismissive statements, the perceptions towards logistics research has revolutionised in the last decades. Trade liberalisation, transport and

information technology have radically altered modern business practices. Of critical importance here is that these modifications and their possible impacts need to be described and analysed, allowing their efficiencies to be gauged in order to ensure optimised systems. Therefore, not surprisingly, dedicated logistics research centres such as specialised institutes and university departments were established. Their direct task is to investigate questions related to logistics such as system dynamics, optimisation and network planning or ITC. As testimony, respondents' statements have focussed upon the inevitability of change and therefore the primacy of innovation:

*There are changes that the logistics sector has to respond to. ... In order to address these changes efficiently, you need technology and optimised processes. ... [T]herefore, a number of knowledge intensive functions and laboratories for logistics evolved, which are ... in Switzerland, Germany and the US. ... Now we have two logistics research centres here in Zaragoza.*

*The most important logistics research institute is of course the Fraunhofer IML. Well, that is now 25 years old. In addition to that, individual University departments have been formed over the last 20 years in Duisburg, Essen, ... Muenster, ... Gelsenkirchen [and] Lemgo. (Tr.)*

It appeared that the research centres focus on a few areas to gain extensive expertise in those topics, since resources are limited. In regards to research areas it is perceived that the knowledge required by a modern cluster is of two general types. Firstly, engineering science and technical knowledge that relates to hardware development such as equipment and IT. Second, there is the sector of economic and management sciences which focus on advanced business models and operational approaches. Both are applied within micro and macros systems, such as a single supply chains up to transport networks and logistics systems. Informants asserted that:

*We need to develop the knowledge one step at the time and keep the focus, because of limited resources. ... We cannot compete in any field, but we can be leading in one topic. So you pick one certain topic were you are strong and grow from there. We focus on the design of large scale logistics systems. ... [T]his big thinking that is our strength.*

*Logistics research includes many topics. First, there is the topic of business and management ... which also includes the area of macro economic for example port impact analysis. ... Then there is also the engineering part including areas such as technical equipment, robotics but also information technology. (Tr.)*

Dedicated research facilities, dealing with the two major innovation areas, create various benefits for the logistics sector such as cost savings, better services quality and increased productivity. What is quite interesting, however, was the perception that the research outcomes and its possible benefits are not always respected. It is openly discussed that some outcomes are not practical enough to be efficiently implemented, and therefore are seen as an unnecessary exercise. The benefits and the contestation of the research outcomes are noticeable in these quotes:

*Technologies that are developed for logistic activities increase efficiency, like the automated transport systems for the 'Altenwerder-Terminal'. ... [W]e have integrated the latest IT innovations. ... Now the supply chain visibility is better and the information flow is more efficient. That reduced operational costs and increased customer satisfaction. (Tr.)*

*Of course in a theoretical model the vendor-managed inventory concept helps. But in practice [it] means that in the end of the supply chain the retailer for instance must be prepared to get the risk of non deliveries back to the manufacturer. In reality they will not do that. Therefore, the real vendor-managed inventory not often happens.*

These few negative perceptions indicate the traditional logistics view of the last decades and should be appreciated as further motivation to improve the image of innovation and its application in practice. Overall, knowledge creation is of growing importance, and must be factored into any Logistics City-Cluster development.

### **6.1.5.2 Private and public involvement in knowledge creation**

Innovation for the logistics sector involves both the public and private sector. It appeared that there is not a strong R&D investment by the private sector, especially in association with supply chain innovation. This seems to be related to the fact that pertinent knowledge appears to be inherited along the supply chain. Meaning that innovations might involve small activities from many different stakeholders along the chain and as a consequence, related R&D expenditures for chain innovation and its outcome might not strongly benefit the investing company, but will be dispersed to other companies in the chain. Whilst this does not advocate strong R&D investment, it is worse when taking SMEs into consideration. It was explicitly mentioned that research within, or even together with, SME is a difficult task, due to limited resources that are needed for the operational functions. This was hinted by many respondents:

*[G]etting R&D investment into supply chain topics does not emerge spontaneously. ... It has to do with the fact that supply chains ... involve many different players. ... [F]orwarders, warehousing companies [and] transport companies [are] linked in the supply chain, but have limited incentives to invest in R&D because the benefits are to a large extent external. The automotive industry, like Toyota, can invest billions in R&D because the benefits are internal.*

*That quite often has to do with company size. ... Small companies do not have the deep knowledge in R&D systems and technologies. ... It is more challenging to complement this with the day to day necessities of small companies. The limited resources need to be allocated for the actual operations.*

Notwithstanding these challenges, the importance of knowledge creation does not diminish. One solution to enable innovation in such an inter-organisational environment is perceived to be based on public research centres. Interestingly, the main impetus for the creation of such knowledge centres is the industry in a somewhat self-generating fashion. If a strong geographical concentration of a certain industry sector begins to emerge, it commonly follows that the regional governments interpret this as a strength

and vigorously support its expansion, which in this case is the development of research centres. Industry demand to create public research platforms aligns with the earlier finding of their time and resources constraints, which naturally limits their own research activities. These issues are demonstrated in following statements:

*We are a public research centre and we are linked to the university. The majority is public basic funding but we also do industry and consulting projects. ... The development of knowledge through this centre is of great support for the region.*

*In Rotterdam you will find maritime and logistics focused universities and research because of the port tradition. ... That is created out of the demand by the companies around the seaport. If you look at the Eindhoven area you will find a big cluster of high-tech universities. Why? The demand came from Philips.*

As a result, publicly funded specialised logistics research centres and new logistics university departments have emerged. Additionally, the public sector also provides partial support directly to the private logistics sector through industry research grants or other financial stimuli. Research centres are often located in a close proximity to the site of demand, due to the ability to facilitate a faster knowledge exchange through both formal and informal networks. This allows all levels of stakeholders to exploit current innovations by universities or research institutes and develop a combined perspective that stimulates possible innovations and their implementation. These findings are strongly supported by the literature review in regards to knowledge spillovers; therefore it is not surprising that the participating clusters have multiple public-funded logistics research centres. These findings are strongly supported these statements:

*There are many logistics companies located in this region. That is why we provide financial support to the logistics oriented university departments and research centres. ... After all in Dortmund there is the Technical University and Fraunhofer. Further there are Universities in Köln and Düsseldorf. ... But, we also provide direct financial support to companies. ... The combination of industry and research centres enables fast exchange of knowledge, sophisticated innovations and their fast implementation. (Tr.)*

*You have those types of firms like Panalpina, Kuehne & Nagel and DHL. They have specialised research units. ... The best known here is the DHL innovation centre. Well they develop some clever solutions. ... But they are the exceptions.*

As indicated in the above quotes, it also appeared that global logistics players inevitably begin to develop their own research departments, provide sufficient financial resources to public research platforms or even tend to operate private logistics knowledge centres. This underpins the increasing understanding and necessity for innovation as part of Logistics City-Clusters.

### **6.1.5.3 Collaboration in the area of innovation**

With inter-organisational issues, collaboration needs to be deliberately addressed, since partnership between public driven research platforms and private enterprises, is

widely perceived to be beneficial. First, each side draws upon their individual strengths to produce an outcome that contributes to current concerns. Second, scarce resources can be shared and used more efficiently and thirdly when stakeholders cooperatively innovate, acceptance of innovation is higher and increases the chance of implementation. These situations were reported:

*[Y]ou would like to end up in a situation where the collaboration is at a strategic level. Where funding is organised long term on a high level and where specialisation is mutually reinforcing. ... Everybody brings in its particular strengths. This enables efficient deployment of resources and increases acceptance of the outcomes.*

*There is actually collaboration between industry and research institutes. ... In this regard it is important to fuse the specific areas of expertise into a holistic system. An example for that is the 'Automated-Guided-Vehicle' (AGV) terminal in Altenwerder. The mathematicians, who programmed the AGVs, collaborated with the mechanical engineers, process engineers and simulation experts. (Tr.)*

Whilst the logic of collaborative situations is perceived as an important factor in recent years, it appears that, in reality, even in well-developed clusters, the ideal research collaboration is not often satisfactorily developed. This lack of collaboration within the industry and public driven research centres can even lead to the disaffirmation of research outcome, rightfully or not. However, it must be explicitly noted that collaboration is improving, as indicated in the earlier comment regarding the AGV-operated terminal. The current lack of collaboration and an example of successful partnership are evident in following comments:

*What you often see is that they sit in an ivory-tower. ... Exchange of ideas and research collaboration is not really brought to the next level. ... For example different logistics institutes departments talk to companies independently without consulting each other. ... [W]hat you ... hear from the private sector [is], please get your act together and speak with one voice.*

*[W]e work together with the Rockefeller Foundation and the British government to design big logistics networks such as health care systems in developing nations. ... We also have three employees of Deutsche Post in the research centre. We are very proud of that. ... We have a number of connections with executive managers... for example the senior Vice President of IBM and Intel, then the CEO of Johnson & Johnson.*

Additionally, it appeared that intra sector collaboration is beneficial. For instance, collaboration within research centres can enable significant insight and create world class knowledge. The exchange of ideas, methods, studies and outcomes are foregrounded and can be facilitated by visiting scholars, summer academies or distinguish speaker series, as is echoed in this quote:

*We have a summer academy where eight Professors from different Universities come to teach PhD students. ... We have also a distinguish speaker series or visiting scholars from around the world to share ideas. ... This way of collaboration is encouraged, since this is the way to create sophisticated knowledge.*

Whilst it seems that the inherently collaborative nature of a supply chain can be a positive force for all stakeholders to engage in joint research activities, it needs a measure of good will from all sides to create knowledge that might not benefit each stakeholder equally.

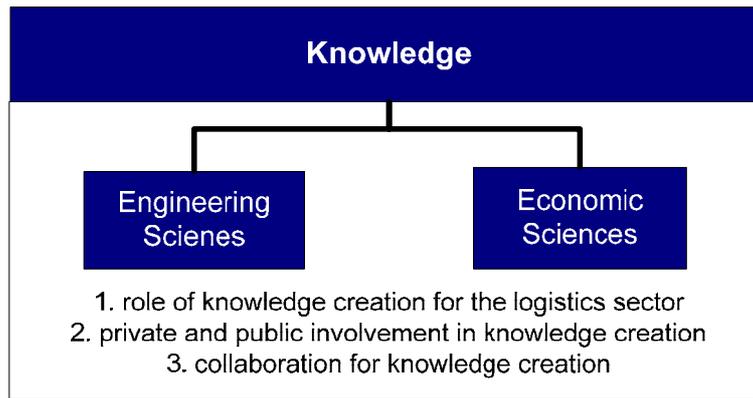
#### **6.1.5.4 Concluding the 'Knowledge' enabler**

Despite the fact that service oriented businesses have generally lower innovation intensity and that logistics innovation is nowadays still somewhat contested, the primacy of continual knowledge generation is of growing importance. Hence, logistics innovation centres focusing on technical and economic/management sciences have been established. Although there are clear benefits of knowledge creation (e.g. cost savings or better service quality), it is perceived that some research outcomes are not practical enough to be implemented immediately.

Interest in supply chain innovation by a single private stakeholder can be limited, due to the dispersed benefits along the chain and marginal internal gains. This situation is exacerbated when considering SMEs that have restricted resources. Although single private stakeholders may have limited interest, they are the main impetus for the development of research centres. In this context, the public sector plays an important role by supporting the establishment of research platforms. The emergence of publicly-driven innovation centres generally occurs in close proximity to industry demand, because of the faster knowledge exchange that stimulates innovations and their implementation. It further emerged that major global logistics corporations start to develop dedicated research departments and support publicly-driven research centres.

The fact that industry and public institutions are both involved in logistics research, underscores the logic of collaboration. There are various benefits through collaboration (e.g. efficient deployment of resources, acceptance of innovations) that are enabled by shared responsibility and the combination of individual strengths. Both internal and cross-sector collaboration occur in Logistics City-Clusters and has resulted in many viable innovations. However, it needs much more good will from all stakeholders to share and create knowledge that might not benefit each equally.

The 'Knowledge' category and its related properties are summarized in Figure 6.1-6.



**Figure 6.1-6: The ‘Knowledge’ category and its properties**

### **6.1.6 Capital Enabler**

While ‘Capital’ was not specifically identified as a separated enabler in the preliminary model, it was included within the ‘financial’ sub-category of the infrastructure enabler. Interestingly, although it was understood that financial stability is necessary for any logistics node development, this aspect was ignored by the executives when asked about infrastructure. It was rather discussed as a separate element, and therefore it was felt necessary to create an independent ‘Capital’ category. The source of capital were agreed to be both the **public** and **private sector**. It was understood as the financial power necessary for investment and acquisitions of essential *operational logistics factors* and the capital accessibility towards *infrastructure development*. These core notions underpinned capital as an undisputable core enabler, which is reflected in the next paragraphs.

#### **6.1.6.1 The private and public role related to capital accessibility**

One immediate perspective is that the financial power is intimately related to public budgets for massive logistics infrastructure investments. Although one might argue that the raising of capital for infrastructure is an issue related to the role of government (influence category), public funding for infrastructure is included in this enabler. This is underlined by the fact that the development and maintenance of trade gateways and the transport infrastructure is crucial for any Logistics City-Cluster. Additionally, whilst infrastructure is commonly financed by the government, there has been a stronger involvement by the private sector through ‘Public-Private-Partnerships ‘(PPP) or indirectly by fee-for-service/user-pays. Following comments demonstrate these complex issues:

*[C]apital my thinking is ... to[wards] the debate of venture capital availability. I don't really associate that with public funding for infrastructure. ... I would regard that as the role of the government like in Porter's framework.*

*Of course infrastructure is highly relevant and therefore the availability of sufficient capital for its development. The source of that are the federal, state and local governments. (Tr.)*

*Then we come to the question of lets say public funding and infrastructure provisions and stuff like that. [This is] really an issue of responsibility of public and private companies. Associated with that is a whole set of complicated issues for example the PPPs or tolls.*

This notion, however, is completely separate from the capital needed to finance the operational functions of the business activities. This includes mainly capital from private institutions, which is needed by the companies for their assets such as buildings, equipment, trucks, trains, vessels and workforce. This is emphasised in following comments:

*The private companies need to invest, in order to invest they need capital. This comes from banks, which could be venture capital, non risk taking loans and [other] stuff.*

*Once we developed the infrastructure, the companies came here. In this area, for example, Kuehne & Nagel have created a logistics site. ... [T]his, of course, needs investments from private capital sources. (Tr.)*

Such consideration underscores that there is a distinction of the 'Capital' enabling category in terms of public infrastructure investment, and private capital which is mainly associated with the operational issues. As a consequence, the enabler can be conveniently segmented into public and private capital sources. The ratio and significance of both is primarily determined by the intended purpose, which will be described in the next two paragraphs.

#### **6.1.6.2 Accessibility of capital for operational functionalities**

The issue of capital availability is of critical importance for any business to enable necessary investments in technology, facilities, equipment, workforce and possible business expansions. However, it appeared that the importance of capital availability and its conditions depend on the particular sector requirements. This interesting notion of capital conditions generated much detailed discussion:

*As a business, you need money, and on fair terms for that matter. Of course, capital terms and conditions are interpreted differently by the distinct logistic segments. ... In an environment where the terms and conditions for the needed capital are ideal, you can expect the region to thrive. (Tr.)*

*[T]he availability of capital ... depends on the type of sector. ... [F]or instance the chemical industry ... has a different capital demand then the ... media sector. The companies in the creative industry are start ups and small. For them ... venture capital needs to be available ... to be more prosperous. The chemical industry has totally different capital requirements.*

Indeed, particular industries favour special capital conditions and if these are available and reliable, the sector has a greater opportunity to succeed. It was observed that the

logistics service industry is not being as capital critical compared to other sectors. A facet of this notion was raised when respondents noted that capital for the logistics sector is normally available if a good business plan exists. However, this must be put into perspective, since services providers can be non-asset or asset operators. In this respect, asset operators such as warehousing, shipping and truck companies are in the need of a higher amount of capital than the non-asset operators. These considerations underscore the micro level concerns of the capital category. The participants opined that:

*I would say logistics is somewhere half way between the chemical and creative industry. Probably leaning ... towards chemicals. I would downplay that a little bit. If you have a good business plan you should get the required capital.*

*Kuehne & Nagel have built a new logistics centre in Altenwerder. Well, anything that is above the actual ground is financed privately. Everything they created there had to be paid by them, and it cost them millions. (Tr.)*

Because of the diverse and dynamic nature of the logistics industry, good accessibility and fair conditions that are tailored to the different sectors would be favourable. A pertinent example of this type of arrangement is apparent in Hamburg with its focus on the seaport. It appeared that the overall strength of this cluster is based on the close relationship of financial institutions and policies towards the maritime sector, which resulted in favourable accessibility of capital. Consequently, Hamburg is now the leading containership financing as well as containership owning place in the world.

*In Hamburg you have a large number of financial service providers and banks that specialized in the maritime sector. ... That has turned Hamburg into a location hosting the most containership owners and ship-finance providers. (Tr.)*

In addition to favoured capital accessibility, a positive ongoing feedback is evident in Hamburg. There are more transport modes and logistics services, other than the direct maritime sector. These did not have the same robustness of funding as the maritime area; however because of their contiguity with the maritime sector there are financial flow-on effects. Traditional and newly emerged private financial institutions have widened their portfolios by including other logistics-related investments such as the finance of transport units or warehouse developments. This has eased the accessibility of capital for a wider spectrum of logistics enterprises by more tailored solutions, as echoed by respondents:

*The concentration of financial services providers for the maritime sector also benefited other logistics companies. These providers have recently begun to extend their financing businesses in the areas of container, logistics real estate and DC developments. (Tr.)*

Accessibility and conditions of capital are strongly influenced by government policies. For example, capital conditions involved in ship financing, for this area such as

favourable terms of amortization and determination of taxable income levels, were supported by national laws. Whilst regulations are dynamic, the impact of the initial policies is immense and ongoing, as evident in Hamburg. In addition to the influence of regulations and laws, the public purse can provide direct capital for operational functionalities through subsidies and interest free loans, as discussed in following response:

*You can also get public funding, some of which does not have to be paid back or simply an interest-free loan. This is offered by the public operated business developers. Of course the company has to fulfil certain criteria. (Tr.)*

As a final statement, it can be said that the availability of capital for operation functionalities is a key factor in the development of Logistics City-Clusters, which intimately involves the private sector and, in subtle way, the government.

### **6.1.6.3 Accessibility of capital for infrastructure investment**

The accessibility of capital discussed in this section will mainly refer to logistics infrastructure; however can be interpreted at a more general level to represent arrangements for social or IT infrastructure. According to the respondents, the capital for infrastructure is a decisive factor and must be able to meet current and future needs. It was found that infrastructure is commonly financed by the public purse, allocated from tax income, implying that governments which have good access to capital will provide higher quality and quantity of logistics infrastructure. This is a significant notion since it is a fundamental initiator for any cluster. The responded commented:

*Infrastructure is not a private market and therefore to a large extent driven by the government. Infrastructure ... needs to accommodate the demand ... and enough capital must be allocated for it. ... [T]his region was never poor. It is a huge advantage, since we can build the infrastructure that the logistics industry needs.*

*The region has been endowed with capital. .... They also benefited from the European Commissions' involvement in infrastructure investments. ... That has enhanced the infrastructure assets of this region and enabled us to be a logistics driven region.*

Whilst some regions are well endowed with capital, there is massive debate in most government authorities of the participating clusters regarding capital allocation. It was observed that the capital demand for infrastructure development outweighs the capital supply; hence, there are continual resource allocation conflicts. For instance, there are tensions between regions, jurisdiction levels and infrastructure responsibilities such rail and road. This imbalance encourages authorities to allocate the capital towards the most beneficial logistics infrastructure elements, which is well known by the participants:

*It is no secret that there are huge capital allocation conflicts within the government. The capital demand is far greater than available funds. ... [E]veryone thinks they have to get a slightly larger piece of the pie. The conflict mostly takes place between the regions and the respective authorities. (Tr.)*

*Hamburg knows where its economic growth originates from. The former Senate therefore did put a strong emphasis on the port and logistics. For example, 3 billion Euros were allocated for the enhancement of port infrastructure. (Tr.)*

It is implied that it is the governments' role to provide capital for huge infrastructure investments. The extent of this agreement is not only seen in the high amount of capital needed, but also in terms of challenging multi land ownership that is involved with infrastructure developments. Notwithstanding these powerful arguments, the increasing cost and complexity of modern systems have meant that even the huge government budgets are challenged, as hinted by the imbalance of capital supply and demand. Hence, the provision of infrastructure is not an easy undertaking and it seems alternative investment concepts need to be integrated, as discussed in the following comments:

*[T]he deepening of the navigation channel of the Elbe-River will costs several hundred million ... and then there is the port lateral motorway. First estimates are around 450 million Euro. ... That is indeed a lot of cash ... and that is why alternative funding schemes are considered. (Tr.)*

*We have just ... seen the report on the local infrastructure funding. ... There's a real investment deficit. It makes you wonder how they are going to get that under control. New funding approaches are needed. (Tr.)*

As a result, private participation in the infrastructure investments is discussed widely, particularly in the form of PPP's and user-pays systems. In this respect, it is suggested that the actual user should be involved in the investment. However, one of the major obstacles of private involvement is the public perception that it is solely the responsibility of the government, and that there should be no user-fees. Whilst this involvement of the actual users of the infrastructure is not extensively developed in continental Europe, it is slowly becoming more common. These notions regarding private involvement are argued by the respondents:

*New finance schemes are introduced in order to bear the needed volume of capital. This means partnerships between the private sector and government. ... However, the public is cautious about this. ... They say, we pay taxes and thus have done our share. People are not prepared to pay for something that was free of charge before. (Tr.)*

*[T]he local government is asking [for] money from the actual user, because they need to maintain the infrastructure. ... So why not move to more user-paid based system ... like Germany with their MAUT system.*

Despite the fact that the acceptance level for PPP concepts by the public is low, it is being implemented and planned for future developments. For instance, the German government recently introduced a freight user-paid system for all motorways and some

federal highways. The so called German 'Maut' system is a toll for freight vehicles and is based on the driven distance, number of axles and the emission category. It was seen as necessary because Germany is located in the middle of Europe and a lot of kilometres are generated by non-German tax-paying companies. These schemes provide more financial scope to invest in and maintain infrastructure, which is necessary to provide a solid connectivity for the cluster. In this regard it was revealed that:

*Some attempts with PPPs have not really been successful. ... But because of the immense capital demand, the port lateral motorway development does not seem possible without PPP. For now, this is only in a planning stage ... [but] the discussions are pointing in this direction. (Tr.)*

*Yes, the Maut-Toll system was introduced in 2005 for trucks exceeding 12t. ... This is a pretty good thing, because now finally foreign users are paying for the infrastructure too. They are using it, after all, so it is fair. (Tr.)*

However, notwithstanding the advantages of a user-pays system, it must be emphasised that this might have negative implications for the competitive positions of a cluster. It appeared that having no tolls means being more attractive for the users to locate their business in these areas, which can feed back to the government in the form of tax returns. Another simple example, commonly used, is that the truck driver stopping for lunch and coffee generates income in the region. Clearly, the government decision to fully subsidise infrastructure or integrate user-fee systems is a complicated issue. The interviewees debated:

*[I]n that extent it leads to policy competition as they call it. Competition between governments providing subsidies in order to enable economic development ... such as infrastructure development.*

*[T]he harbour dues in Rotterdam are much higher than in Hamburg. Everybody in Rotterdam is complaining that the charges that ships have to pay in Hamburg cannot be enough to pay for the infrastructure. The subsidies are distracting the competition.*

Most important is that the capital raised from the use of the infrastructure must be transparently allocated for the maintenance and expansion of the available facilities and not used for other purposes. This will increase the infrastructure quality, which in return can outweigh the competitive disadvantage by the fees and turn it into a sophisticated strength. Whilst, in hindsight perhaps, this all appears to be an obvious concern, few respondents even argued that economic liberalism, in the form of less public involvement in the investment for infrastructure, would be beneficial. The following two comments support these notions:

*At the moment the associated revenue generated by the port finances its development. ... Hence, the income is basically invested in expanding and maintaining the infrastructure. ... However, I think government funds will be needed again. (Tr.)*

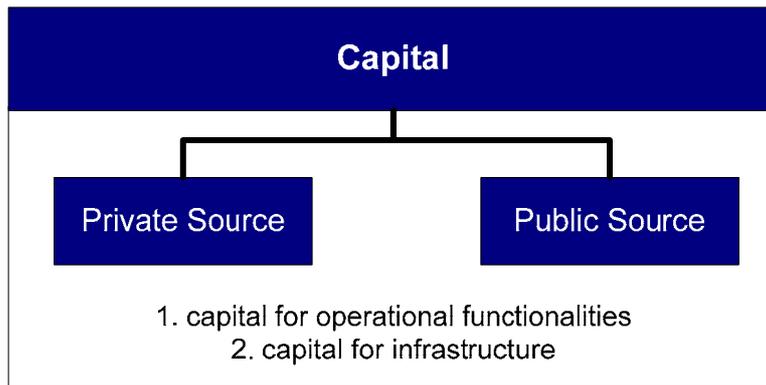
*[P]rivate involvement in the provision of infrastructure would be efficiency enhancing. ... [I]f you would move towards this direction that would be good for all. ... [W]hen it comes to investment in transport infrastructure ... you would expect that the private market would invest in the transport corridors between Rotterdam and central Germany.*

Despite the perception that more private involvement is efficiency enhancing, it brings with it certain risks. The private sectors' focus is their business viability. Hence, infrastructure investment will only take place in areas that promise an acceptable return. Because, not all infrastructure developments are economically viable, balanced development of a holistic logistics infrastructure network is unlikely. The main financial power provided towards the infrastructure is, and still will be the public sector notwithstanding that the role of the private sector is increasing.

#### **6.1.6.4 Concluding the 'Capital' enabler**

The 'Capital' enabler is differentiated into public and private capital sources (Figure 6.1-7). It appeared that the favourable accessibility and conditions of capital for logistics operations is an important factor for the successful development of a Logistics City-Cluster. Although the accessibility of capital for logistics is not seen as critical as for other sectors, its dynamic and diverse character prefers tailored solutions. It was found that benefits from favourable capital conditions for particular logistics activities have a positive flow on effects to other logistics services. Whereas the public sector can influence on the availability of capital indirectly through regulations or by direct financial support, it is the role of the private sector to provide direct capital to finance the elements of the logistics activities.

Capital for infrastructure investments is commonly provided by the public sector. Hence, authorities having good access to capital are able to meet current and future infrastructure needs, which results in a competitive advantage. However, the endowment of capital for infrastructure development is challenged by the fact that capital demand is outweighed by the supply. Consequently, there are resource allocation conflicts leading to the participation of the private sector in infrastructure investments. Although private involvement through user-pays systems or PPPs is contested, it helps to increase the financial ability to enhance infrastructure capacity. Whilst private involvement can have negative implications for competitive positions, since paying for the use of infrastructure can decrease the attractiveness as a location, the provision of sophisticated infrastructure due to direct capital allocation can be advantageous.



**Figure 6.1-7: The 'Capital' category and its properties**

### **6.1.7 Competition Enabler**

Whilst 'competition' was not integrated as a separated enabler in the preliminary framework, one question in the in-depth interviews was asked in relation to its role. This was not formulated to justify competition as an enabling category, but rather to establish a comprehensive understanding of how competition might impinge upon the characteristics of the preliminary categories. In hindsight, the notion of competition may have warranted immediate inclusion as a separate category, since competition was an integral part of cluster theories. Given this situation, it was not surprising that in the early stages of Round II, robust competition emerged as an important enabler for the development of Logistics City-Clusters. However, it was found that there is a significant difference between the competition of organisations located within the cluster and the competition between different clusters. Thus, it was necessary to consider both notions separately as '**Intra Competition**' and '**Inter-Competition**'. It further emerged that there is also an important distinction in *trade gateway competition* and other *logistics service providers*, which will be discussed separately in the next paragraphs for both intra- and inter-competition.

#### **6.1.7.1 The role of intra-competition**

The existence of intense domestic rivalry within Logistics City-Clusters has positive effects on the entire economic system. In particular, it was indicated that these effects include the prevention of exaggerated pricing, the increase of flexibility, the enhancement of quality and the quick adoption of new practices in response to client demand. These advantages are evident in following comments:

*There are a lot of reasons why companies do want to achieve the lowest logistics costs or best quality and a lot of reasons why they don't. They reason why they do it, has a lot to do with competition.*

*The competition between logistics companies results in low prices. Additionally, companies are also forced to adapt their services as required by the customers and to be more innovative. (Tr.)*

There is no 'universal competitive strategy'; instead tailored schemes that are suitable for the particular logistics operations are necessary to understand and invoke competition. In this context, different competitive strategies heavily apply when looking at traditional gateways services and other logistics operation such as freight forwarding or warehousing.

#### **6.1.7.1.1 Intra-competition of trade gateways**

It was determined that one international trade gateway, which needs a critical market size to justify the high investment in multiple logistics infrastructures (e.g. terminals), is sufficient for a cluster. This implies that until the market is large enough, there will not be sensible opportunities for internal competition. In this context, gateway competition is not always possible or even economically advisable, which is certainly the case where smaller markets are involved. Therefore, internal gateway competition, in terms of its traditional services, tends to be more oligopolistic, and in some locations monopolistic. Some informants pointed out that:

*[S]ize translates into advantage and size makes investment in the gateway and transport infrastructure economically viable. ... There are no real internal terminal competitors ... here. The problem is that ... it is very expensive to build ... and you need the cargo for it.*

*Competition for port activities is rather limited. After all, you cannot develop various terminals, which will not be utilised. ... The question is how much volume is going to pass through this node. Volume is the critical factor for competition. (Tr.)*

If the internal competition of trade gateway activities is at a low level, the threat of exaggerated price regimes or low quality levels is increased. On the other hand, attempts to stimulate internal gateway competition by investments in unsustainable multiple transshipment infrastructure can result in wastage of scarce land and the commitment of capital that could be used in more beneficial ways. In this challenging context, major customers of hub activities can own and operate transshipment nodes to reduce the risk of being in a captive transport situation. This implies that these players must have an appropriate critical market mass to justify large investments. However, these developments do not stimulate competition when not being subject to external pricing or open accessibility. These challenges are noted by respondents:

*You need land and I would say in some places land is quite scarce. Why would you waste it by developing a terminal that you can't utilize? If it is not feasible, don't waste money and land.*

*Well you want several terminal operators to have competition. ... However, that is not always possible and, certainly, you should not force it by building new terminals that will only be marginally utilised. (Tr.)*

*Maerks as a logistics provider actually owns and operates terminals. Sure they will always serve their own vessels first and not their competitors. In one famous case Maersk went from Singapore to Malaysia with their entire terminal. Then they also take some of the support activities with them and other logistics services.*

What is evident in the last quote is that the giant logistics companies operating their own terminals can, because of their market power, move their entire terminal operations from an established cluster to another which offers better conditions. This is a case of overt external competition between clusters, which is discussed later, but is introduced in this section since external gateway competition is one factor that can avoid the negative implications due to the lack of internal competition.

#### **6.1.7.1.2 Intra-competition of logistics service provider**

As found earlier, the lower value-adding activities such as terminal operations have forward and backward linkages. Given this interrelationship, an appropriate internal level of competition for traditional gateway activities should be encouraged to stimulate positive flow-on effects. Notwithstanding this essential role, it is suggested that the competition of other logistics activities should be considered separately (e.g. trucking, storage, light assembly or supply chain management). These activities have the potential to form a much more competitive environment, due to the lower critical mass of demand and lower economic entry barriers. Interviewees recognised this, suggesting:

*There are a lot of logistics operators here. They do not need the high critical market mass that a terminal needs in order to break even. ... However, if you already have the 20 largest logistics companies located in your cluster, as we do, it is difficult to get the 21st one interested. At some point the pressure of competition, due to the limitation of demand, is just too large. (Tr.)*

Although the critical mass to enter a market is much lower, it has its limits as indicated in the above quote. Additionally, the notion of investment and critical mass is somewhat simplistic; since the higher the value-add nature of the activities are, the more advanced the expertise and skills are needed. This significantly increases the entry barriers. The important realisation from these interviews is that if there is competition between logistics activities in a certain geographical area, it will push companies to improve their service levels and to innovate as they strive to achieve or maintain a competitive edge, benefiting the Logistics City-Cluster as a whole. Respondents asserted that:

*Kuehne & Nagel will not start cheering when we announce that Schenker will establish a subsidiary here. Of course, it is great for us, because ... the competition increases and that means that the companies have to make more of an effort to deliver better services. (Tr.)*

*All the important firms related to chain management such as K&N, Panalpina, DHL, Danzas, and Schenker are Swiss or German. They are the world leaders and agglomerate within those countries. The strong competition pushes them to be innovative and to deliver sophisticated logistics solutions.*

Although the geographical area in the last quote exceeds the possible planning boundaries of Logistics City-Clusters, the fact is that a region with strong competition will both strengthen the logistics industry and provides a significant level of economic impetus for the cluster.

### **6.1.7.2 The role of inter-competition**

It was found that inter-competition has the same benefits as intra-competition for Logistics City-Clusters. Further it appeared that there is no universal competitive strategy and therefore the differentiation between gateways and other logistics activities is necessary, based on their unlike competitive schemes. In this regard, the intensity of competition between clusters is very obvious at the gateway level and is associated with their trade corridors and cargo flows. However the direct competition of the other logistics activities is harder to grasp and link to the economic advantages of possible locations. The benefits and competitive schemes are explicitly stated:

*Madrid claims that they will be the future logistics cluster in Spain. This is a challenge for us but it is healthy in the end. We need to stay competitive, provide good quality and have acceptable prices. For now imitation is the best form of flattery.*

*So there is competition of ports for serving this hinterland. [So] this is really competition of cargo flows from the gateways to markets.*

*The competitors for the logistics activity as a whole are difficult to define, because you compete with any other location. ... The logistics operators are much more flexible in choosing a location and base their decision on economic factors such as land price and transport cost.*

Certainly, both types of competition, first as a gateway node and second as a location for other logistics activities, are essential and part of any Logistics City-Cluster. Interestingly, it emerged that the competitors in each of the two sectors can vary, as is noted:

*With Köln we only compete at the port level, hence as transshipment location. In this respect there is less competition with Dortmund. ... However, Dortmund is a strong competitor as a location for high value-add logistics activities. (Tr.)*

The decisive factors of the two types of inter-competition and the associated factor of proximity are discussed in the following three paragraphs.

### 6.1.7.2.1 Inter-competition of trade gateways

The consideration of inter-gateway competition is strongly related to trade corridors, and therefore on the primary and secondary connectivity to the markets. Inter-gateway competition is less developed in an environment in which a gateway has superior connectivity to a market that is perceived in terms of lower connectivity costs and time. This includes possible idle time and cost due to congestions. It is also linked to mass-transport connectivity to the markets, measured in both quantitative as well as qualitative terms, as is claimed by the respondents:

*Hamburg serves the East-European hinterland better than Rotterdam and Antwerp. Those two, however, have advantages serving the Netherlands, Belgium and northern France. ... The hinterland you serve is dependent on the quality of the connectivity link to markets. ... [Quality is defined] as costs and time (Tr.)*

*Important is the time and cost factor. ... Commonly if you closer to a market you will have an advantage in both. ... But, you need volume so you can offer better rates. ... Well in the bulk segment there is no real competitor. This is because of the Rhine river system as an efficient mass-transportation mode ... [that] is directly linked to our seaport.*

On the other hand if the connectivity of gateways is comparable to others, there is the possibility of stronger inter-gateway competition. Obviously, superior connectivity depends on the kind of commodity itself, since it has a critical influence on the operation of logistics activities and therefore on the choice of possible gateways. To appreciate the complexity of this issue, it is noted that for some commodities there is a critical reliance on efficient mass-transport options to specific markets, for example the connectivity of Rotterdam for coal and ore due to the river system connecting to the steel production market in Germany:

*There was a study related to a possible shutdown of the Rotterdam-Port. ... As a result the critical function of the port is the transport of coal and ore to the steel industry in Germany, enabled by the mass-transportation of the rivers. No port means big trouble for the steel industry in Germany. ... [T]he containers could find easily other ways. The competition in this sector is much stronger.*

Indeed, there are other commodities for which superior connectivity is hard to claim. In this context, the container is considered as a 'footloose' commodity that attracts more competition. This observation is reinforced by the standardized functions of the gateways and the flexible trade connectivity for containers. Subsequently, the introduction of standardised equipment and processes has led to fierce competition, since differentiation is no longer a determinant. The decision of which gateway or trade corridors will be chosen is open to subtle economic factors and convenient market access, as is illustrated by following quotes:

*They strongly compete as transport corridors for footloose commodities such as containers. ... By footloose I mean they can shift from one port to another easily. ... They*

*only think about boxes not the cargo inside. ... There is no unique customer demand. You have to stick to the operational characteristics.*

*The containers go into Europe anyway. In that sense a lot of that is based on price and quality of hinterland connectivity. ... Antwerp in terms of the proximity is the bigger competitor than Hamburg. Look at the gravity of consumption and we have a better access to them than Hamburg does.*

These comments reinforce the fact that cost and time have a close relationship with proximity to areas of consumption or production. However, those depend on the commodity itself and are additionally influenced by geographical and economical factors.

#### **6.1.7.2.2 Inter-competition of logistics service providers**

As discussed earlier, logistics activities are historically located around trade gateways and along trade corridors, which is influenced by factors such as land scarcity, proximity and connectivity to markets, workforce availability and the type of commodity. Indeed, the level of competition to attract logistics activities is very much related to the economic advantages of a location. Consequently, the competition between locations to attract logistics activities can be very fierce, since there are many location options. These arguments are evident in following statements:

*When it comes to logistics activities like warehousing and customizing, the clusters compete with each other ... [and] also with all other locations. ... They can look at each other in the logistics sector, but there is a much broader market out there.*

*[I]t depends on the company and their needs. If they want cheap land because they need to occupy a lot of space, they choose affordable locations. If they need access to multimodal transport options, they come directly to the Duisburg port, ... because connectivity is much better there. (Tr.)*

Implicit in the last comment is that each activity has its particular demand specifications, meaning that certain locations are attractive for particular logistics operators and unattractive for others. Therefore, not surprisingly, most of the established Logistics City-Clusters share a similar competitive position towards other possible geographical areas. The common factors are scarce or expensive workforce, high land prices, very good connectivity and close proximity to markets. That these are critical factors was argued by the respondents:

*[When] locating a DC the competitor for Rotterdam is Belgium, northern France and Germany. They have good access to the final markets.*

*[T]hese clusters have a shared competitive position contrasted to other locations. ... High land prices, a tight labour market and very good multimodal connectivity are common.*

*[For instance], Barcelona has logistics parks in the port. ... [T]hey are very good and respond quickly, but they are expensive. In the other locations the land prices are low, the labour market is better [but] multimodal quality is terrible.*

In addition, some high value activities are not necessarily related to economic advantages of operational functionalities, but are seen in good social infrastructure, where occupations associated with these activities are based on a highly skilled workforce that expects quality of life. This especially occurs with a logistics firm's HQ or strategic planning, which can be geographically detached from the operational activities. Therefore, various locations that offer suitable social infrastructure can be chosen, as is acknowledged in these comments:

*In regards to the attraction of various high value activities, such as the area of supply chain design or management, the important factors are the softer social aspects. ... By that I mean quality of life and good social infrastructure.*

*Then you have competitors for head offices. London, Hamburg and Singapore are the main competitors. London and Hamburg have most of the HQs in Europe that relate to logistics activities. That is based on living standards and the highly skilled workforce.*

The competition of attracting economic activities is common practice and does not only account for Logistics City-Clusters. Factors that determine competitors are of economic, geographical and of societal nature. Competing geographical areas, beside other clusters, are more likely to be located along existing trade corridors, having lower economic entry level. In terms of HQs competitors are defined by social infrastructure and the skill level of the workforce.

### **6.1.7.2.3 Inter-competition and the notion of proximity**

A final notion that emerged, which in hindsight may seem obvious, is that clusters which are closely located to each other are in a naturally stronger competitive environment, because they serve similar markets and utilise the same trade corridors. The more distant Logistics City-Clusters located from each other, the less they are perceived to be competitors. For example, clusters located in North-Europe do not perceive the logistics hotspots in South-Europe as strong competitors. This notion of competition and proximity is clearly echoed in following comments:

*As a location for DCs serving southern Europe, sure there is strong competition to Madrid, Barcelona and the Italians. We are closer together and share the consumers.*

*Most of the activities have to take place in the region. That is why, for us, the competitors are located in the North Range. That includes Rotterdam, Antwerp, Amsterdam, Hamburg and Bremen. We do not really compete with Barcelona, Marseille ... or Shenzhen. They are too far away. (Tr.)*

However, a timely warning was sounded during these discussions. Possible location advantages, such as superior accessibility to markets, can change due to exogenous political or economical reasons. Political change and its impact will be discussed in more detail in Chapter 7, for example regarding the enlargement of the EU and the

related increased market size. The same accounts for economical factors such as a drastic increase of fuel prices and its impact on sourcing. These changes have a subsequent impact on the proximity notion of inter-competition. In some cases, a cluster that was in a shared competitive environment may become superior for a specific trade corridor. Alternatively, one location might drop out altogether or new locations might be considered as new competitors. The respondents argued:

*The EU expansion to the East has given us a competitive advantage against the Netherlands. They have always been our most feared competitor. ... On the other hand, the competition from the East is increasing. (Tr.)*

*The development of transport costs plays an important role regarding location decision. Does it make sense to have long transport distances because of fuel costs? ... If you look at it this way, the factor of competition between locations is dynamic. (Tr.)*

Despite the continually changing environment and its impact on the inter competition, generally the closer the locations are to each other, the more fierce is the competitive behaviour.

### **6.1.7.3 Concluding the 'Competition' enabler**

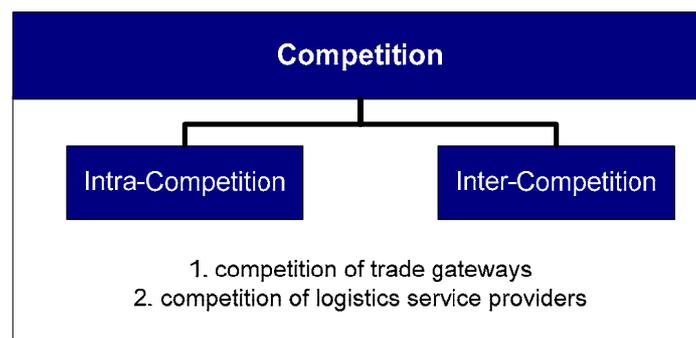
Competition has positive effects for Logistics City-Clusters, which is perceived as stimulating efficient logistics operations and catalysing fast adoption of new practises in response to client demand, leading to increased innovation and the introduction of competitive prices. It further appeared that there is a significant difference between intra- and inter-competition, which needs to be considered separately for gateway activities and other logistics services.

It was found that intra competition of gateway activities is not always economically advisable due to the need for high market mass. Smaller markets favour oligopolistic or monopolistic gateway structures because investment in multiple transshipment activities might not be sustained. Another observation is that some gateway activities are established by the actual customers, mainly to reduce the risk of being in a captive situation. This, however, does not necessarily mean that the competitive position is strengthened, since these activities might not be subject to open access. Important is that monopolistic or oligopolistic structures should be prevented, since they have a flow on effect to other logistics services. In this context, it seems that the other logistics activities do need a smaller critical market size and therefore have lower economic entry barriers. This allows multiple services of the same kind, providing healthy competition. However, it must be recognised that entry barriers increase since the higher the value-add nature of the service, the more skills are needed. Logistics

agglomeration embedded in a competitive environment is beneficial; but to ensure this kind of a competitive milieu, legal and administrative entry barriers should be fair.

Inter gateway competition appeared to be robust and is commonly associated with a trade corridor and its quality of connecting to the intended markets. Quality is perceived as lower costs and shorter transport times, and if those are comparable it is very likely that inter gateway competition occurs. However, the factor of quality depends strongly on the commodity; therefore a trade gateway can have superior connectivity for one commodity; however not for others. Inter-competition of LSPs is related to the question in which area these should locate. This competition is quite fierce, since the activities can be situated in various locations that provide economic advantages, such as the availability of land to a competitive price and suitable connectivity to markets. In this context Logistics City-Clusters have a similar competitive position. HQs and some higher value activities main factors for the location choice are the social infrastructure and the skilled workforce.

Inter-competition has a strong relationship to proximity, since the closer the locations are to each other, the stronger their competitive behaviour. Nevertheless, proximity and its inter-competitive influence are dynamic due to exogenous political and economical reason. Hence, a Logistics City-Cluster that has been in a shared competitive environment may become superior for a specific trade corridor or vice versa. These emerged notions are indicated in following Figure 6.1-8.



**Figure 6.1-8: The ‘Competition’ category and its properties**

### **6.1.8 Governance Enabler**

In Round, I it appeared that Logistics City-Clusters consist of many different stakeholders that have individual aims and requirements. However, it is crucial that the efforts of the stakeholders are aligned to enable a holistic development. The preliminary governance and policy enabler therefore is interdependent with the needs of individual stakeholders and the macro co-operative understanding as a system.

Consequently, planning and legislation should be promulgated with the objective of facilitating individual and group development, and were merged into a single enabler named 'Governance'. This enabler is seen as a mediating platform that informs and guides all stakeholders in a collaborative manner to achieve values that benefit the cluster as an integrated system. Notwithstanding the overall arbitrating role, there are specific understandings in regards to the *necessity of governance*. Additionally, it appeared that there is a range of governance structures, from **historically grown** models to **pure Logistics City-Cluster governance** and its actual practise today. The next paragraphs will discuss the notions of governance.

#### **6.1.8.1 The necessity of governance**

Common for any Logistics City-Cluster, there are separate public authorities and private stakeholders involved. If these parties do not act in a collaborative environment and align their activities and instrumentalities, there will be no wider benefit to the system because of individual divergent objectives and motivations. For example, an authority that invests only in road infrastructure will not consider an optimised system that reduces congestion and atmospheric pollution. In contrast authorities that also take rail or ICT policies into consideration, can provide a better utilization of the existing infrastructure, reduce pollution and cost. The main implication here is that a governing body or agency, which incorporates public authorities and major private stakeholder groups of a Logistics City-Cluster, is perceived as an important enabling factor. The interviewees stated:

*If this would be a private project, there would be a total different objective. ... [T]his is a public project and the government says our mission is to develop the 'Freight Village' to create new jobs. ... Now we are creating an entity that coordinates this system. ... Everybody part of the 'Freight Village' will be represented, such as the operators and the government. ... They all have benefits from it, and therefore all have to work on it.*

*For me let's say the kind of distinctive characteristics of cluster governance is that it is multi actor and that it is somehow deals with collective issues and is organised in form of an institution or alike. This will benefit the cluster development.*

It became immediately apparent that the participants perceived an individual collaborative governance system as beneficial, resulting from the co-ordination of different stakeholders. These co-ordination effects can reduce duplicated actions and, further, in the extreme case, can avoid opposing activities that have a negative impact on a cluster. It also reduces the effect of unclear division of work and lack of accountability for developments. Indeed, joint activities lead to a better system that is much more recognised and attractive internationally, as emphasised in following comments:

*We want to be a sustainable location ... and it is for this reason that we aligning activities within the cluster. We do not want to tell individual operators how to do their business but there are interfaces between stakeholders that can be coordinated to achieve benefits for the cluster. (Tr.)*

*The 'Logistics Initiative' was created to support the cluster. Meanwhile, about 350 private and public members are involved. ... If we are approached with problems ... we bring the involved players together so they can find solutions. ... Hence, we coordinate joint activities and support cooperation between the stakeholders. (Tr.)*

Indeed, it is argued that a governing body to ensure effective co-ordination of the Logistics City-Cluster as a system will enable the stakeholder, whether private or public, to invest and participate with confidence.

### **6.1.8.2 Historical grown governance**

Although it is widely agreed that the efficient governance of the complex and multi-actor driven system is a desirable factor, it is not well implemented. One of the main reasons for this seeming paradox is that logistics, as an industry sector, is a relatively young field and its importance for the regional economy is just evolving. Nevertheless, the participants indicated that, in a wider sense, a recognisable kind of coordinating structure does exist. One type of this strategic governance is commonly based on the major international gateway and its authority. In hindsight, perhaps, this development is linked to the historical evolution of the logistics sector and its close linkage with gateways. This has led, in most instances, to the integration of logistics planning by gateway authorities as part of their wider strategic planning. While it is subsumed into the strategic planning, the focus of relevant authorities still centres on traditional gateway functions such as transshipment activities and transport infrastructure. Hence, gateway authorities do not fully take the needs of many other enablers into consideration. Several informants responded in following manner:

*[L]ogistics is still a rather undeveloped part of the business and its importance as an economic driver is still not fully understood. ... [T]here is no real logistics cluster governance taking all stakeholders into consideration.*

*Is there are a strategy for logistics here? I think it is done in some extent. ... [I]f we do look at the port development strategy, yes I believe there is something like a governance structure for logistics in place.*

*In Rotterdam the logistics activities are submerged in a wider port planning. ... But, it is very general. I criticise the strategy because they don't provide choices. ... It is really classic in the way that it focuses on the development of its traditional functions. More terminals, rails and road connections. It is not really based on the wider understanding of logistics, IT or knowledge functions.*

One very interesting observation is that the importance of high value-add logistics activities within a gateway seems to be restricted in the future. This is understood when appreciating the land scarcity associated to historical grown gateways and the fact that

its core functions must stay efficient to accommodate future growth. Therefore, the available land will be used to cover the demands on its traditional functions. Additionally, gateway authorities planning and administering power is predominantly limited within the precinct of the port itself and its functions. External to the precinct there are other stakeholders that have their individual objectives, guidelines and legislative power, which might not be aligned with the gateways' strategies. Taking these multiple requirements into account, the likelihood that other enabling elements are given precedence by the gateway authorities is unlikely. Informants asserted that:

*[T]he strategy identifies the niches where we feel and want to be competitive. This is relatively new ... and we start to become a little bit more selective. Right now the selection is regarding higher-value logistics. ... However, we will not consider the whole logistics system as part of our strategy. That is far beyond our boundary.*

*I don't think this area is the perfect location for a DC, because it is an incredible claim on the scarce land and highway capacity. If you attract more of these activities you increase congestion and reduce the overall attractiveness of the port. ... It does not fit perfectly in our strategy. The port is selective and focuses on its core tasks.*

Another observed kind of strategic governance related to Logistics City-Clusters is associated with logistics associations. This, however, takes place on a greater geographical scale than on a metropolitan level and also focuses on one particular issue. In this case, the focus is on the higher value-added services such as distribution related activities. The respondents noted:

*The 'Netherlands Distribution Council' is the Dutch initiative for a logistics strategy and focuses on value-add activities of DCs. That is so to say a governance platform for the Netherlands ... trying to align distribution strategies and related issues as a nation. They are involved in innovation and marketing.*

Clearly, there are only weak relationships towards other necessary enablers of Logistics City-Clusters, such as infrastructure or implications on the workforce. Additionally, their planning and legislative powers are very limited within their particular area and the participating companies form the sector.

### **6.1.8.3 Pure Logistics City-Cluster governance**

Currently, it seems that activities related to the enablers are commonly handled in an uncoordinated and dispersed manner, whilst it is implicit that the involvement of all stakeholders in a governance structure is necessary. Given that a geographical boundary can depend upon the administrative responsibility of an area, clusters will necessarily include several municipalities and, in some extreme circumstances, even federal states. The notion of dispersed activities and shared administrative responsibilities are echoed in these quotes:

*[M]any participants with different goals are all stirring the same pot. The idea of a governance structure is to avoid chaos and redundant functions. ... [What is] important is to define who does what and who is in charge. The more you zoom out, the less important it is to talk about individual companies. ... The idea is to appear as a holistic cluster. (Tr.)*

*We have this construct of the 'Metropolitan Region Hamburg' with the goal to strengthen Hamburg and the local economy. ... That means we are talking about three federal states and many municipalities that are bordering Hamburg. (Tr.)*

Hence, it is of prime importance that the governance structure includes all related authorities, but also all relevant private stakeholders to optimise the development of the enablers as a system. The activities between the stakeholders need to be aligned and coordinated by taking their individual strengths into account. This can be achieved by a governance body acting as a platform that facilitates collaboration between different stakeholders. It leaves the actual decision making process, the implementation and developmental process to the particular stakeholders. Its objective is to identify and to enhance certain situations through regular workshops and the creation of special taskforces. This notion was discussed by the participants:

*The governance structure should integrate private and governmental stakeholders. Regarding the private stakeholder, all the important logistics companies should be represented ... and sectors that complement the logistics industry. ... The government pillar consists of all important authorities, for example the infrastructure or education departments. (Tr.)*

*A governance structure, as a central point of contact, should regularly bring the stakeholders together in order to discuss current and future challenges. Identified topics can turn into projects that then are worked on by the respective participants. Thus, governance is a service provider for the cluster which suggests and organises meetings, facilitates working group projects and mediates decision processes. (Tr.)*

Indeed, a central decision-making governance structure that is responsible for the implementation of certain activities is presumptuous, since there are too many different and complex aspects driven by various motivations. Instead the role of the governance structure is seen as an arbitrator. Consequently, to enable a governance body that functions as a mediator, there are factors that need to be considered. First, the commitment and trust of all stakeholders is required to form a governance body. This is perceived as monetary support for the operational expenses and as the participation of all stakeholders in regular discussions and collaborative projects. Both can lead to more trust and closer relationships, as is illustrated in these statements:

*You have to say one thing; the idea of central decision making or management structure for such a large cluster is presumptuous. You will never be able to centrally control such large number of stakeholders that have individual objectives. (Tr.)*

*Hamburg came up with the idea to create a registered society ... which incorporates industry, commerce and government. Not just to have funding for the governance structure, but rather because they want their collaboration and expertise ... to find out*

*what is actually needed and to solve problems. Regular meetings are essential in which we exchange ideas, give mutual feedback and initiate projects. (Tr.)*

The second factor is the consensual understanding of the stakeholders. It also must be appreciated that existing structures and decision making institutions cannot be ignored and need to be integrated in the discussion and implementation processes. This is of significant importance if the governance body wants to be seen as an objective mediator. A final factor is associated with performance measurement. It appeared that a governance body needs to understand how well they perform in relation to their objectives. Hence, it is useful to identify a small number of key indicators to track the progress of the governance body, which also helps to demonstrate stakeholder compliance. These factors are supported by the interviewees:

*All stakeholders have to respect one another and participate in the governance body, despite their differences. This also means that existing structures should not be overlooked. This is important for the governance body. (Tr.)*

*We need objectives, benchmarks and KPIs for the governance structure, which, of course depend on the stakeholders. ... Indicators would be, for example, the creation of additional jobs in the region, number of successful international marketing presentations or the number of projects that have been successfully implemented. (Tr.)*

Despite the ideas of a governance structure, real collaborative governance is not yet truly developed and dispersed activities are still predominant. However, one participating cluster has already created a collaborative system that bridges relevant private and public stakeholders. This particular governance body acts to facilitate improvements by co-ordinating actions that were identified in a survey involving all stakeholders. The objective of the logistics governance body is to identify developmental needs in five selected areas, and then working in a collaborative manner with all associated stakeholders to remove impediments and to align regulations. The respondents of the related cluster highlighted:

*Here in Hamburg we have a cluster governance structure called 'Logistics Initiative'. They have only existed for two years. Actually they do their job quite well and are supported by the industry and the government. Especially financially, since they had start-up funds of half a million. (Tr.)*

*We decided to create a network structure that brings stakeholders together which have decision making power and want to improve as a cluster. Due to a survey involving all core stakeholders we identified five critical areas, which the governance body will be focusing on to strengthen the cluster holistically. (Tr.)*

There is an important factor that should not be overlooked when talking about governance. The way the governance body is established and operates depends on the political system and the values, beliefs and objectives within the region. For instance, the governance system in Hamburg may not be efficient for other regions, since its structure and tasks are designed through a survey involving all stakeholders in

the region, representing their objectives, regulations and cultural backgrounds. Hence, the governance system has to be suited to the region and cannot be standardised.

*There are two ways things happen, de jure and de facto. De jure ... means by law. De facto means that is the fact and it is so. Here is the thing called Aragon Logistics. De jure they want this umbrella organisation to coordinate everything. I am not sure if that is good, since de facto we connect with each other naturally not because of laws.*

*Governance here happened naturally. ... They were never forced to plan governance. ... Of course Singapore is brilliant example of planning for the 'Logistic Cluster' by the government. But Singapore is a small peculiar country and they are run like a corporation. That will certainly not work here.*

Despite this, governance is commonly perceived as being enforced by a governing body that should have oversight and the overarching responsibility as a mediator for promoting and developing the cluster holistically. This agency should be clearly detached from, however, integrating all relevant stakeholders. In pursuing this vision, six major tasks have emerged in the interview. These will be supported by one quote only, but representing a widely accepted view of all interviewees:

- develop an efficient network platform for all stakeholders to exchange knowledge

*Of course you want to create a network which is based on a governance body that serves as a platform to connect the right people when dealing with particular challenges and to initiate projects. That is why it is important that everyone participates. (Tr.)*

- coordinate the work of the various government authorities and logistics industry to ensure appropriate infrastructure development

*A coordinated approach in the area of transport infrastructure makes sense. By that I mean that all planning authorities, together with partners in industry, have to think about which projects are to be tackled, which also includes the notion of funding. (Tr.)*

- identify regulatory impediments and needs of the logistics industry and work with the relevant stakeholder to remove those

*We bring all the parties concerned together and try to work out solutions with regard to operational or strategic challenges. We, as the 'Logistics Initiative', have, for example, optimised the inspection of empty containers at the port with assistance of all respective stakeholders. (Tr.)*

- market the cluster by addressing the competitive advantage

*If you market the core values of a cluster, there is a higher possibility of companies to locate here. We organize marketing events. ... Such as the attendance at the 'Transport Logistics Fair' in China, where we take a few companies with us and say: Here's a location that is the holistic logistics package. (Tr.)*

- strive for international, regional and local interconnectedness

*The linkages of the cluster to other regional and international locations need to be strengthened in order to improve our position. That means generating freight links to these locations and to tie them to our cluster. This can only be done as a holistic location. (Tr.)*

- strive for knowledge creation in the logistics sector and education of the workforce

*Most of all you expect to solve challenges or improvements in the form of analyses and innovations. Of course, this needs to be driven by the expertise of industry and science.*

*... Indeed, the training of staff is very important. This is why we are bringing the companies and education authorities together, which already resulted in new training courses. (Tr.)*

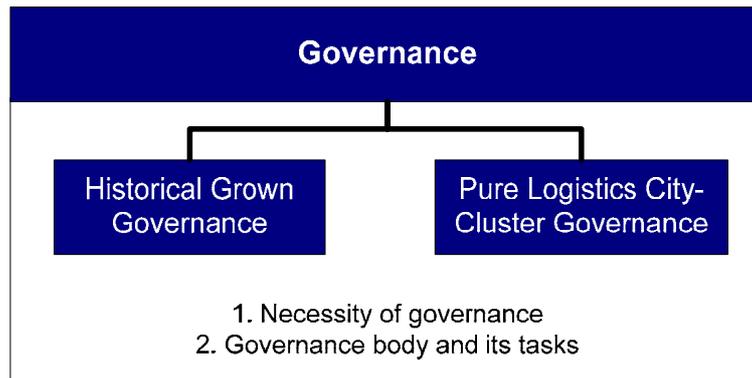
The governance body should lead and co-ordinate multi-organisational effort involving the public and private sector to promote and develop an integrated system. This will benefit and increase the competitive advantage as a Logistics City-Cluster.

#### **6.1.8.4 Concluding the 'Governance' category**

It appeared that collaborative governance, seen as a co-ordination of all associated stakeholders, can increase the efficiency within a Logistics City-Cluster by reducing duplicated and opposing activities as well as lack of accountability for developments. Although it is a desirable factor, there is no true logistics governance in place. Instead, logistics strategic planning is linked in most instances to the associated gateway, and in few occasions to logistics associations. However, this pattern of planning is not optimal, since there is, and will be, continuing tension between the holistic cluster and the core objectives of gateway authorities or associations. Additionally, planning and administrative power is limited to the sphere of a gateway authority or logistics association and not at a holistic level.

It appears that one way to ease the tension of uncoordinated and dispersed planning is the introduction of a governance body that fosters collaboration between public authorities and private enterprises. This governance body needs to be independent from a single stakeholder but should take the strengths of all stakeholders into consideration. Therefore the governance body is perceived as a platform that conveys collaboration and leaves the decision making and the developmental processes to the stakeholders. As a mediator it enables regular meetings to identify and discuss challenges or ideas, which then might lead to the creation of special taskforces.

A significant postulate for the existence of a governance structure is the commitment and trust of all stakeholders. Additionally, the governance body's aims and operation need to be built on a consensual basis and existing decision making structures cannot be ignored. To allow an efficient body and to demonstrate compliance, it emerged that KPIs should be in place. It further needs to be appreciated that any development of a governance model will be dependant upon the political system, values and norms of the respective region. Despite the possible different setup and characteristics of governance bodies, six common tasks were identified. The sub fragmentation and the major properties of the 'Governance' enabler are indicated Figure 6.1-9.



**Figure 6.1-9: The 'Governance' category and its properties**

## 6.2 Conclusion

The description of the eight enabling categories is the beginning of a grounded knowledge base that fills the gap in the general understanding of such complex system. These enablers are the foundation of the Logistics City-Cluster framework and reflect the needed characteristics of its successful establishment. It is in this context that a clear structure for the enabling system emerged. The market enabler is the base enabler creating the demand to establish the functional enablers, whereas the governance enabler is the integrating element that brings the functional and base enablers together as a holistic system.

It was also observed that there is a hierarchy within the functional enablers, in which some are seen as more important or advantageous than others. Commonly, every participant strongly referred to the superb logistics infrastructure and services of their cluster and perceived these as factors for their competitive advantage. In this cohesion there is a strong relationship to the workforce executing the services. Therefore, in order to have competitive services, the skilled workforce as a competitive advantage clearly emerged. The interdependency between excellent infrastructure, efficient logistics services and experienced workforce as a competitive advantage is reported:

*The multimodal connectivity of Rotterdam and the number of connection, the frequencies and the reliability is an asset. Yes our advantage is the efficient infrastructure and services. ... Another strong advantage we have is the labour force. The people here are flexible and their education ... is on high standard.*

*We have a couple of key competitive advantages. These are ... efficient customs procedures, quality of the logistics services and infrastructure. In total it is our long term experience in logistics that gives us a big advantage. You have sophisticated services and you have experienced people.*

The fact that high quality infrastructure, services and workforce are commonly perceived as the leading competitive strengths, does not limit the importance of the

other three functional enablers. Alteration in cost structures and shifting of demand create by the base enabler causes changes to which a cluster must adopt. Successful clusters, however, should not only try to respond to their environment, they should try to mould the environment in their favour. Therefore, constant improvement and upgrading as part of the knowledge enabler is critical. Certainly, to achieve efficient logistics operations, justified infrastructure development, continuous improvement and innovation, capital and competition are needed. However, the true advantage of a Logistics City-Cluster lies within the holistic concept and therefore the involvement of all enablers and their interaction. Hence, competitive advantage is increasingly a function of how the base and functional enablers can be integrated as an entire system, as echoed by the participants:

*I think the core competitive advantage is the holistic development of a cluster. All the elements need to very good. .... I think this is the foundation of competitive advantage.*

*I think the competitive advantage ... is based on the brought defined logistics cluster so to say. The efficient mixture of all elements and how well those work together.*

This indicates that governance as the integrating enabler, which focuses on the alignment of the entire system and not only single elements, is of great importance.

As a final notion, challenges in some enablers are not necessarily negative, since this forces enhancement and innovation. For instance, the scarcity of land for infrastructure development, common in Hamburg and Rotterdam, has led to new technological innovation and logistics systems increasing existing transport infrastructure capacity (e.g. satellite transport networks or ITC). Hence, constrains in some enabler can be elevated to future advantage through long term investments in sophisticated and tailored solutions. This increases the likelihood to sustain the position and to growth as a cluster, since sophisticated factors are more attractive and harder to copy.

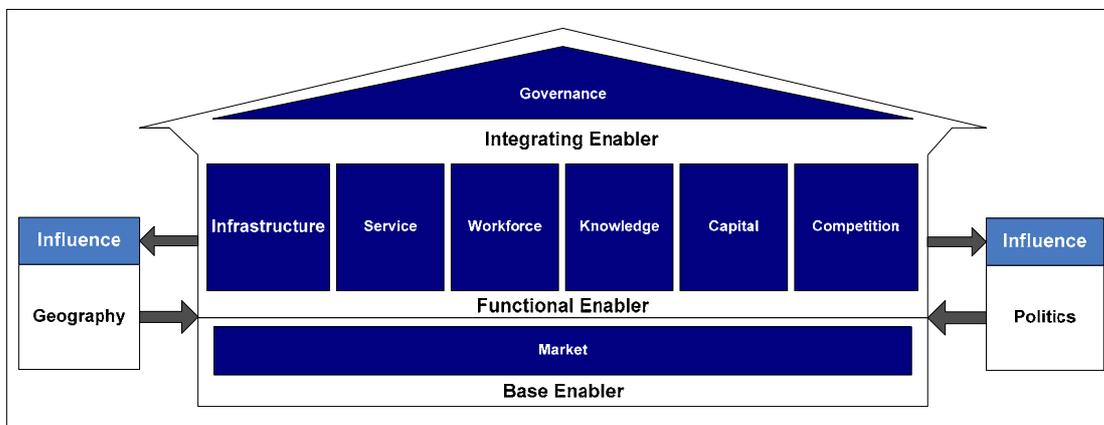
The holistic structure of the eight enablers and their micro properties were transformed into statements and tested in form of a questionnaire in Europe and the Asia-Pacific region. Both the statements and their results are presented in Chapter 10. The next chapter will discuss the influential factors of 'Politics' and 'Geography', which will enable a comprehensive understanding of the complex mutual relationships between influential determinants and the Logistics City-Cluster's enablers.

# Chapter 7

## Delphi Round II: Explication of influence categories

### 7.1 The role of influences on the ‘Enabler Categories’

The role of the ‘Influence’ category on the development and functioning of a Logistics City-Cluster was not recognized as a separated category in Round I. However, two external determinates were identified as factors that influence or impact the enabling categories. These two notions, **political factors** and **geographical patterns**, were included in the interview as separate questions, since it was felt that a detailed description of these would facilitate a clearer and more sophisticated understanding of pressures on the enablers. Some influential relationships were indicated in the preliminary model as part of the enablers, however new valuable insights were found. Indeed, these notions have emerged to be such significant factors for the development and growth of Logistics City-Clusters, that it was imperative to describe these influential factors with their own major category (Figure 7.1-1).



**Figure 7.1-1: The influential factors of politics and geography**

The next paragraphs provide a comprehensive understanding of the complex relationships between the two influential determinants and the enablers, which are not unidirectional, but mutual. It begins with the discussion of political influence on all eight enablers. This is then followed by the description of geographical influence on the base and functional enabler, including the notion of past dependency. The Chapter ends with a brief summary of the influential factors.

## 7.2 Political influence on the enablers

Informants unanimously stated that political considerations at any level strongly influence the setup and development of a Logistics City-Cluster. In an earlier contribution, Porter (1990) considered government as a single independent element influencing four key determinants within his diamond model. His findings seem to hold for Logistics City-Clusters. Indeed, after coding and analysing the interviews, it was concluded that politics is seen as a substantial influential factor (obvious, subtle or reflexive) on all existing enablers, and being reciprocally influenced by the enablers. The importance and relationship of politics to the eight enablers will be described in the next paragraphs.

### 7.2.1 The role of politics for the market enabler

In addition to the market dichotomy, the notion of market size and quality was identified as a key issue and it is in this context in which political authorities focus their influence. Clearly, a critical minimum market is necessary for any economic activity and governments have a number of tools to achieve this. First, the government itself can be a market for logistics activities. For instance, they can use the Logistics City-Cluster as a platform for distributing humanitarian aid, or purchasing logistics services for national purpose, such as Defence. Whilst this role of a direct demand creator should not be over emphasised, it can, however, be a useful factor when attempting to create more sophisticated demand that would lead to an enhancement of the cluster. This so called 'early demand creation', albeit a relative small contribution for new and more efficient logistics strategies or technologies, can be conveniently stimulated through political channels. These notions were evident in following comments:

*After all, the Defence Department regularly demands logistic services. Like, for example, when tanks have to be transported to a special military training camp or when humanitarian aid needs to be distributed. (Tr.)*

*Much more important, however, is when the government demands high quality logistic services or, by means of small and well-aimed inquiries, attempts to integrate certain standards in logistics. (Tr.)*

Secondly, as argued in the market enabler, the size of markets can be increased by linking the cluster to international venues. For example, Hamburg acts as the international entry point for secondary markets in Europe, which allows further logistics value-add possibilities after entry and before shipment to secondary nodes. In this regard, authorities can influence the linkage to international markets by framing policies such as trade agreements, special trade zones or import/export regulations. Easing the access to appropriate foreign markets and via versa due to supportive government

regulations can significantly increase the catchment area. However, access to international markets needs to be related to the geographical location and the appropriate functional enablers. If these are not favourable, political support through trade policies might not be sufficient to generate a positive effect. These tools are well known by the participants:

*The favourable import/export regulations give us an advantage. ... If you have to pay import duties, you will not get them back. If the import duties are 10% and the value is high, it's too bad especially when you have to ship your goods outside of the EU again and pay tax a second time. ... Here you can avoid paying these duties and only pay in the country of destination.*

*There is a new EU customs regime and with appropriate IT we can depict it in such a way that we have virtual custom bonded areas. ... This is advantageous to attract international commodity flows, since it results in less administrative complexity. (Tr.)*

In addition to the influence on market size, there is also the issue of quality enhancement through political leverage. As revealed earlier high quality markets force logistics service providers to meet and maintain the required high standard, which leads to innovation and increased productivity. Attracting and integrating leading market companies can be significantly supported by favourable policies or incentives. Possible tools are, for example, direct or indirect subsidies and specific land use regulations to entice companies to settle in close proximity. Government incentives to attract economic activities within a region will be described explicitly in the section of the influences on 'Service' enabler. Additionally, authorities can institute regulations that provide easy access to standardized quality information regarding logistics services, providing the comparison of their offerings for the customers. Another avenue for political influence is the establishment of regulations that have a direct effect on the quality standards on the market segments such as the wide suite of ISO-Norms. These strategies were hinted at by the respondents:

*The most notable attraction was the European Distribution Centre (EDC) of Zara ...as a first world class retailer. ... Because of their very fast customer response, they demand a location that provides good infrastructure, workforce and yes other direct incentives. We provided the right area to the right price and other favourable conditions.*

*What you perhaps know is that the 'Logistics Performance Indicator' ... ranks Netherlands second in total and also first in four out of seven criteria. These items are for example customs, quality of the logistics industry [and] infrastructure.*

*Every year the top 100 logistics companies are determined. About 240 German and 140 international logistics service providers are examined. That enables logistics clients to understand who offers good service and who might be avoided. (Tr.)*

Size and quality of the markets are the major areas of political influence. The market size can be increased when the government itself demands logistics services, which is only meaningful when it stimulates new and more efficient logistics strategies or

technologies. More effective political influence aims to increase the catchment area by linking it to international locations. To increase the market quality, authorities attempt to attract world leading companies of the market segments and stimulate regulations that affect the quality standards of logistics and market companies.

## **7.2.2 The role of politics for the infrastructure enabler**

Logistics City-Clusters actually depend on the provided infrastructure and its efficiency. Therefore, to stay competitive, sophisticated infrastructure and the historically dominant role of governments in developing and upgrading the infrastructure is clearly recognised. In this context, two core notions arose from the interview. The first is related to general policies and the second is associated with government funding. Certainly, before considering the funding, which will be discussed in the coming 'Capital' influence section, policies must be in place to actually allow infrastructure developments. For instance, there must be land available that aligns to the actual land use zoning, empowered by authorities. Hence, government can either favour logistics infrastructure or, if having other priorities, impede it through their planning control, as is experienced in these cases:

*Important is actually access to land ... and here the government involvement is critical. [W]hat they do, is ... make land available for logistics. Their permission to construct infrastructure is essential.*

*The government has changed the qualification for the land and now only allows residential buildings. It increases the value of the land and removes commercial traffic because ... the logistics facilities have to move outside.*

It is also understood that developing large scale logistics infrastructure is associated with the challenging situation of multi-land ownership, which concerns governments and their influential capacity. In this context, authorities can use their power to overrule private ownership and curb excessive pricing which might arise after announcing the development. Indeed, 'compulsory acquisition' is one of the powerful tools that can influence the development of infrastructure. But governments also have the power to allow access to the final developed infrastructure by many different users. This can be necessary, since a private operator's infrastructure may be limited to selected users due to micro economic concerns. The informants asserted that:

*So in the bible when God said 'let there be light' in Latin it is FIAT LUX. That means God commanded and light happened. ... The government has the same power of command when it is about infrastructure development. They have the possibility to buy the land at a given price, whereas the owner has no chance to oppose this decision. ... That is to hinder overpricing for a greater benefit of the region.*

*There is not much land in the port area that is privately owned. The properties are mainly provided by the authority on a long-term lease basis. The goal is to retain government*

*influence as particularly declared in the lease contracts, such as the clause forcing open accessibility to all possible clients. (Tr.)*

Although private sector involvement in infrastructure development has increased, governments have to ensure that the quantity and quality of physical infrastructure meets current and future demand. Long term planning for infrastructure development and its upgrading and maintenance is both critical and beneficial, since land and capital is scarce in Logistics City-Clusters. Hence, a spatial allocation framework for the logistics infrastructure development is an efficient tool for authorities to address the future demand and to enable a well configured infrastructure network. This should also take the one-stop information platform and social infrastructure into consideration. The participants stated:

*We have drawn up a masterplan for logistic property developments until 2015. Separately, we have long-term plans for transport infrastructure. ... Additionally, the authorities are planning in the area of information infrastructure ... that includes marginally the virtual part. For example, the government supports the port's information platform. (Tr.)*

*Important is that we plan the social infrastructure long term. What I mean is that we take the workforce needs into consideration and plan accordingly. ... As said earlier we lack highly skilled workforce, which is partly due to missing good social infrastructure. Now this is part of our infrastructure plan.*

Governments have various tools to support appropriate infrastructure developments such as spatial planning guidelines, compulsory acquisition or regulations to enable open accessibility of infrastructure. Important is the long term planning of infrastructure to meet future needs. In this context, consideration of the broad community and industry views is essential to overcome the challenges induced by the multi-stakeholder environment.

### **7.2.3 The role of politics for the service enabler**

The preferred method of exerting an influence by political authorities over the service enabler appeared to be more subtle. In the opinions of the informants, the services will be viable if political planning is used to provide a good foundation through the means of other enablers (e.g. educated workforce, stimulation of innovation and accessible capital). However, this influence can also be very explicit when introducing regulations that lower administrative entry barriers, but also through subsidies to attract economic activities. Subsidies can be manifested through the setting of lower infrastructure-related costs, the provision of added public funding or, more indirectly, by tax concessions. The priority of the logistics sector can be also noticeable by the application of favourable land use regulations. These regulations influence the kind of companies that can settle in a particular area, and therefore certain companies or

sectors are more likely to settle in given political setting than others. Those points were made:

*As a government you have to identify the challenges of the logistics sector and think about appropriate supportive measures to assist the logistics companies. For us here that would be, for example, workforce education and also the area of innovation. (Tr.)*

*The government has been very nimble ... when focusing on logistics activities. So frankly speaking politicians give logistics priority and want to attract those companies. ... The city hall gives benefits to the companies to move to this area, such as investment premiums. ... [T]he government sells the land for a low price, puts the infrastructure in place and offers tax incentives to the logistics operators.*

*The first requirement for them to get a piece of land is that they have to provide logistics functionalities. If someone would produce TVs, then we would say that Plaza is not the place to locate. Nearby we have an industrial park for pure manufacturing activities. If you're distributing or offer value-added services regarding TVs, then Plaza is ok.*

Authorities also have the power of co-determination as a shareholder of firms, which can take place to support start ups, implement technology or to ensure that basic critical functions are available by which private power is limited or massive investment is needed. Although the government has the power of co-determination, the operation is generally left to the private sector. It was further observed that there are some important services which are fully regulated and operated by authorities, such as 'customs' activities. Indeed, publicly regulated and operated activities play a key role, and therefore need to be carried out efficiently to avoid the diminution of the entire logistics system. It was stated:

*The municipality, state and federal government are shareholders in our port authority. However, the business is run by us as a private company. ... As long as business is going as planned, the government does not intervene on an operational level. (Tr.)*

*[T]he train authority and the company that manage the airports are hybrids of a private and public company. The operation itself is done by the private sector but the government is involved in the strategic planning and the regulatory side of the operation.*

*One of the competitive advantages is the efficient customs procedures. ... Previous it took a truck with an empty container quite long to be processed. This was because the driver had to open the container since the custom-official is not authorised. ... Now there is a security officer who opens the container for the truck driver. Hence, it enables a much faster throughput at this bottleneck reducing the overall congestion in the port area. (Tr.)*

Indeed, political influence on this enabler can be subtly organised through other enablers. However, there are direct influences to attract services such as lower administrative burdens or the provision of subsidies. There is also the power of political co-determination that can support the establishment and the operation of services if the private involvement is limited. A very strong influence exists for services that are fully regulated and operated by the governments.

## 7.2.4 The role of politics for the workforce enabler

The availability of quality workforce for the core activities is a crucial factor for the long term sustainability of Logistics City-Clusters. Therefore, it was not surprising that the political influence towards the workforce enabler is associated with the enhancement of the workforce's skills and size. Clearly, education and training will improve professional and technical skills, resulting in higher quality, increased productivity and faster innovation. As a consequence, the political influential power to enhance the level of workforce education and training is associated with the creation of specialised logistics education centres, educational frameworks and possible tax deduction for educational activities. The informants revealed:

*The present of high quality education does make a difference. Good logistic workforce is crucial and therefore the government has to provide the right education policies. ... The government needs to ensure that enough education facilities are in place to meet industry demand.*

*Regarding long term measures we attempt to get youth interested in logistics and developing specialised apprenticeships. ... Short term measures can be retraining courses. ... For example, the federal government funded the retraining of 1700 long term unemployed to work at the terminal ... In addition to that, vocational education and retraining is tax deductible. (Tr.)*

This, however, is not a simple matter than the exchange between government and industry is critical, since the provided training has to be suited for the required skills, which differ for each logistics profession. Consequently, there is an urgency that government education officials must interact with the industry to ensure introduction of appropriate regulations and education initiatives. Interestingly, industry in the last decade is taking more responsibilities in regard to workforce education, such as industry involvement in education curricula or financial support of education facilities. The collaborative role for education initiatives is evident in following comments:

*We have an Institute that is called 'Knowledge Main Port Rotterdam' and they try to setup PPP investing in education. ... [It] does not directly fund initiatives but has networking capabilities to create education infrastructure.*

*Nowadays the private companies are increasingly involved in the area of workforce education. ... 10 years ago there were no private arrangements in that respect. It was understood ... that the government and the companies had to collaborate and invest together in education. (Tr.)*

In Germany these educational collaborations have emerged as an important driver for the provision of a well educated and trained workforce at the apprenticeship level. In this vocational training system the students firstly attend theoretical courses that are provided by public schools and secondly accomplish practical education in an industrial setting. At the same time, a regular update of the educational curriculum is achieved. Consequently, existing apprenticeships are adapted to state-of-the-art techniques and

new logistics apprenticeships are initiated. The collaboration also accounts for tertiary education, which is of critical importance since this workforce level will steer the direction of this industry. This powerful coordination was discussed by the participants:

*What we really respect here in Zaragoza, is the apprenticeship system from Germany. That is perfect for the logistics sector and is coordinated in collaboration between the public sector and the industry.*

*It is important that the government-shaped apprenticeship keeps up with the industry's requirements. At our general meetings, industry and government meet to discuss the current workforce requirements. ... If necessary, ... the respective apprenticeships are developed, such as for example the logistics business manager. (Tr.)*

*Well, in the future a larger highly qualified workforce will be needed. This is why we have invested in logistics tertiary education. ... [I]n addition to that, the Kuehne School of Logistics was founded ... which is tailored to the 'Logistics Cluster Hamburg'. (Tr.)*

Certainly, the standards of all education levels must be both adequate and accessible. In this regard, officials need to enable a high educational standard not only by updating curriculum and by providing state-of-the-art facilities, but also by ensuring excellent educators. Authorities also need to guarantee that the right mentality develops, so that teaching is seen as a prestigious and valued profession having the appropriate remuneration. Hence, suitable regulations must be in place to provide the right education and training environment. These notions are indicated by the respondents:

*[T]he education needs to be very good. When the education is very good you find enrolment is very high and when enrolment is relatively high you can get the employees that you need. ... The education infrastructure is fairly good. ..., however the reward for the lectures needs to be good to attract motivated and skilled educators.*

Further, it appeared that if a regional skilled and motivated workforce is not accessible, governments can support by introducing regulations that allow skilled immigration. Beside the fact that education courses may not be well suited, this further implies that the living quality might not be appropriate or that the logistics sector is not attractive. Both situations can be positively influenced by government strategies. Firstly, marketing campaigns aimed to improve the perception of logistics can increase the potential employer base, and secondly long term planning of adequate social infrastructure can attract and keep workforce. The participants explicitly said:

*Our government has enforced the regulation to allow skilled immigration. ... This is necessary for particular sectors that lack workforce. We hope that will help the economic development.*

*Appropriate social infrastructure ... is necessary to keep the educated labour. ... We have to continuously increase the standard of living. That is high on our government agenda.*

*We have carried out a marketing campaign in collaboration with the industry. We did this to increase the profile of logistics ... and to get adolescents interested in logistics. (Tr.)*

Governments aim to ensure that the quantity and quality of the workforce is on an appropriate level. Therefore, authorities create logistics education centres, develop educational frameworks and provide tax deduction for education purposes. Further, officials intervene by marketing campaigns, skilled immigration and provision of suitable social infrastructure. An important factor here is the collaboration with the private sector to ensure that the needed qualifications are known, updated and integrated.

### **7.2.5 The role of politics for the knowledge enabler**

Knowledge generation is of growing importance because logistics plays a central role in today's business and makes a difference between success and failure. In this regard, governments can support by providing favourable policies and financial stimulus (e.g. basic funding, grants and scholarships) for research institutes and university departments. This funded research can further positively influence the education level of tertiary scholars. The students have easy access to state of the art knowledge and can directly apply such knowledge in an industry setting. These arguments are evident in following comments:

*They all linked in the supply chain but all of those have just limited incentives to invest in R&D because the benefits are to a large extent external. ... Therefore, smart innovation policies from the government and quality knowledge centres are the key issues. ... The long term view of the government ... [enabled] the attraction of the MIT and opened the 'Zaragoza Logistics Research Centre'.*

*Meanwhile, it is understood that it makes no sense to wait for the leading innovative companies. As a result, the Senate decided to promote innovation with regard to Hamburg's economic strengths as a transport and logistics node. (Tr.)*

*We are working on a research project related warehouse management system. The ideas and concepts we develop are introduced to the students of our institute. They can then take the new knowledge and maybe implement some elements after graduating.*

As discussed in Chapter 6, whilst knowledge generation should be included in any successful private business, this is not always possible. Inevitably, to stimulate innovation within the private logistics sector, authorities can introduce favourable innovation policies that enhance collaboration between the private sector and the public driven research platforms. It was observed that joint innovation projects are common in Europe, which allows interested industry partners to engage their innovation foci and for public research centres to capture commercially important topics that will have immediate impact. In such a context, the government ensures that the needs of the industry and research institutes are understood, and that any administrative or legal barriers are removed. Policies can also stimulate this

collaboration by providing co-funding for the partners. This role is evident in following statements:

*Politics here ... supports the strong linkage between the industry and our ... government funded logistics laboratory. ... Some companies in fact have requested our services. Now we work in collaboration with these on RFID systems, which hopefully will be applied in Plaza.*

*In the context of promoting innovation we are calling for collaborative research proposals. At the moment we are offering 23 million Euro for which institutes can apply for in collaboration with industry. (Tr.)*

*[I]n the area of innovation we directly support the businesses and research institutes. ... For example, at the moment we reinforce collaborative innovations ... in the area of telematics and interconnectedness of hubs. (Tr.)*

Additionally, there is always the opportunity to directly support innovation and knowledge creation within the companies by providing grants and tax deduction without involving any public driven research centres. Intensive direct support is generally linked to emergent ideas and technology which are part of the government strategic direction. Commonly, governments will reduce their direct assistance the more the innovation advances, since private market forces will take over. What is of importance here is that the retention of quality status through innovation is an ongoing process and not an easy undertaking, especially when considering the time and monetary resources required. Therefore, long term strategic focus of governments on logistics innovation is vital to provide appropriate support through policies and fiscal means. The participants commonly suggested:

*Last year, an innovation program for seaport technologies was initiated. It's called ISETEC2 for which the federal government provided 40 million Euro. Half of these funds go directly to companies. (Tr.)*

*If ideas seem to have a positive impact and high expectations, the governments will support these in the first stages of the innovation process. Once the innovations are implemented and established, we don't have to provide financial support anymore. (Tr.)*

*The Department of Science attempts to focus their innovation activities. ... The core reason is the limitation of the budget. The measures are commonly concentrated on the regional core competences and economic drivers. ... For us it is logistics. (Tr.)*

The stimulation and ongoing development of innovation emerged as the key objective for government. The focus lies within favourable policies and the fiscal support for public research platforms. Authorities also stimulate innovation within the private logistics sector through particular leverage strategies. First, those are regulation and financial incentives to achieve a better collaborative environment between public research centres and industry. Second, these include also direct co-funding and grants for private companies.

## 7.2.6 The role of politics for the capital enabler

What this investigation has clearly established, is that availability of capital for infrastructure is strongly linked to direct investment of governments. Due to the importance of logistics infrastructure, notwithstanding the necessity for appropriate IT and social infrastructure, sufficient capital needs to be dedicated by the government for its development and maintenance. It appeared that each authority level attempts to arrange maximum possible allocation of earmarked funds from the higher political level. Local governments continually negotiate infrastructural grants from state or federal authorities, and in the case of the participating clusters, infrastructural funds were also sought from the European Union. Following example illustrates the nature of government systems regarding infrastructure development:

*The local government is asking us [for] money, because they need to maintain the infrastructure. But, there are also infrastructure grants from the European Union. For example, we as the state government received grants from Europe for the rail ... development.*

*You have the political factor which is very important, because Rotterdam's politicians have a very good lobby to the federal government. ... So a very expensive dedicated rail track has been constructed from the port of Rotterdam to Germany, benefiting our seaport.*

The government is not always capable of bearing the needed infrastructure investment cost, and private participation in capital investment takes place. This, however, does not diminish the importance of political leverage in the development of infrastructure. The introduced PPP and user-pays systems show that governments still have a crucial and leading role, for which the German highway 'MAUT' system or harbour dues are good examples. These obvious influences of political decisions towards PPP and user-pays systems were well anticipated:

*User-paid based systems support the financing of infrastructure. For instance, in Germany there is the 'MAUT'. ... The company 'Toll Collect' oversees the collection of the 'MAUT' on behalf of the federal government, which then can allocated the toll for maintenance or new roads.*

*[T]he ships arriving in the harbour have to pay. ... These harbour dues are collected for the public purse to pay for the related infrastructure.*

Indeed, capital also includes the necessity of accessible funds that are used to finance the logistics industry. Although logistics activities are perceived as moderately capital intensive, the need for the right capital condition is important. Clearly, good capital accessibility and conditions will encourage stronger investment. This will lead to the natural growth of logistics businesses and provide innovation opportunities. In this context, it was found that capital availability is influenced by government regulations, which consider regional development policies reflecting the importance placed on

logistics by local authorities. The earlier example of Hamburg demonstrates that favourable capital conditions for the containership industry led to massive development in the maritime sector and benefited the entire logistics sector. The role of governments in making capital available for the logistics sector is evident in following statements:

*[P]rivate companies need to develop, they need to invest, in order to invest they need capital. This comes from banks ... and is indirectly influenced by government regulations.*

*Due to the tax laws here in Germany ... a large number of financial service providers and banks ... have specialized in the maritime sector. The laws made it possible for Hamburg to become the world's biggest location in ship finance. ... These providers have recently begun to extend their financing businesses in the areas of containers, logistics real estate and DC developments. (Tr.)*

Additionally, governmental influence on capital availability and conditions are also associated with the permission and support for attracting foreign capital. Moreover, the government can also directly provide capital to the logistics operators in terms of subsidies, interest free or low interest loans. The lack of capital availability was recently experienced during the global financial crisis and governments' intervention in the financial market is clearly demonstrated. Billions of dollars are pushed into particular economic sectors or guarantees are given to enable capital availability. The magnitude of those tools initiated by governments is acknowledged in the following comments:

*The government ... also has a point of contact for 'Foreign Direct Investment' (FDI) ... that supports any interested international party in terms of administrative burdens.*

*The government can provide advantageous capital conditions to certain industries and companies. Even interest-free loans for a certain time, but these are mainly for SMEs. ... [W]ell, it can also act as a guarantor so companies can obtain capital. (Tr.)*

Infrastructure investments are critical for Logistics City-Clusters and sufficient capital needs to be allocated by governments for its development and enhancement. Although the involvement of private capital due to PPP or user-pays system is increasing, this does not diminish the leading public role. Additionally, authorities can influence the accessibility of capital for logistics operators by the nature of politically framed regulations, interest rates and positioning towards foreign capital. Indeed, favourable capital conditions will encourage stronger investment in the logistics industry and provide opportunities for future growth.

## **7.2.7 The role of politics for the competition enabler**

Competition within and between Logistics City-Clusters was identified as a necessary feature to prevent over-pricing, to stimulate innovation and increase quality. Participants indicated that political influence has an important impact on competitive behaviour. Indeed, for clusters having a market size that is sufficient to host many

different logistics service providers, the reduction of legal and administrative entry barriers are appropriate government tools to stimulate competition. Additionally, the enactment of regulations to prevent power concentration through anti-trust law plays an important balancing role. To attract businesses and therefore stimulate competitive behaviour, some clusters even provide tax reduction or other incentives as discussed earlier. The informants asserted that:

*[[I]t used to be very easy for foreign companies to locate in the Netherlands. However, now they have to pass difficult administrative procedures. ... But, we need to enable lower administrative hurdles for companies to settle here. That's how we can get a critical mass of companies here that compete to each other.*

*We welcomed a European private rail company ... and others did not. ... Or to give you another example soon we will have APM, Hutchison and DP World, the three largest terminal operators. ... [W]e focus on lower administrative entry barriers for all logistics companies ... [and] [w]e try to avoid power concentration of single companies.*

Competition of most logistics service sectors within a cluster is not difficult to achieve through low economic entry barriers and government intervention. However, competition at the level of traditional gateway activities is not always possible or even economically advisable. As a consequence, tools such as lower legal and administration entry barriers or anti-trust laws are not effective, suggesting that alternative approaches are necessary. What was observed is that political actions are aimed at lowering the critical mass of needed markets. This can be achieved by providing the necessary infrastructure for the traditional gateway activities such as the terminal and its facilities, and leasing those to different operators who will then compete on the operational level. Whilst such an approach increases competition, it only leads to oligopolistic structures. Nevertheless, if sufficient competition for trade gateway functions between different locations exists, this level of political influence ensures appropriate quality and pricing. This was evident in following comments:

*We are building a large container terminal that is mainly paid by the national government. ... This then will be leased to terminal operators on a long term contract. We prefer different operators to stimulate competition. However, most important here is the competition between different locations, like between us and Hamburg.*

*Competition on the terminal level is harder to achieve. We create the terminal infrastructure and then lease them to private companies. ... The long-term lease is advertised and then goes to the bidder who fits our criteria the best. These are quality, experience and, of course, the price. (Tr.)*

Stringent political strategies are enforced when competition between companies cannot be achieved by the approaches above. This might be in situations where the specific markets are too small and inter-competition is not sufficient. In such situations, commercial activities can be regulated by monitoring and setting the prices to avoid exaggerated fees. This also needs to include open access regulations to enable all

stakeholders to participate. Price setting by political fiat is instituted in the observed Logistics City-Clusters, although not associated with the prevention of over pricing by monopolistic behaviour. As an example, the relevant 'Port Authorities' have set prices for port entry, which is perceived as one type of political control of traditional gateway function. The participants stated:

*Should we really have no competition for some activities, which is not the case, we still have the opportunity to set fixed prices or influence them to our liking. That way, we can avoid exaggerated prices due to monopolies. (Tr.)*

*Of course, if you read all the news, everybody in Rotterdam is complaining that the government charges that the ships have to pay in Hamburg cannot be enough to pay for the infrastructure.*

Inter-competition, associated with political influence, appeared to be sometimes used unfairly as a bargaining point by logistics firms when negotiating with governing bodies. Issues held up for debate include the perceived benefits of locating in different areas, based on regional governmental policies and regulations. Those are commonly perceived as policy competitions between different clusters. Despite this observation, within particular legal boundaries the political influential power balances. In the studied cases, the regional political power is limited by higher level law enforced by the federal government or the EU. Hence, the Logistics City-Clusters that share larger legal boundaries have similar frameworks and tools, and in this case it is more difficult to refer to 'unfair competition'. These situations were reported by interviewees who said:

*There is even an unfair competition. ... Hamburg subsidises a lot, but here they don't subsidise at all. ... They give the land away for free [and] ... the public infrastructure [is] for free ... That is silly. How can they do that?*

*The government wants to attract the companies by all means. [T]hat leads potentially to policy competition between regions as they call it. ... However, there are certain rules in the EU. So you can manoeuvre within the boundaries, but you cannot break these. ... If clusters share the political environment, the legal boundary is very similar. ... But, everything is political. What can I say?*

The objective of governments is the stimulation of competition to increase quality, innovation and to avoid over pricing. The reduction of legal and administrative entry barriers and regulations to prevent power concentration are appropriate tools to stimulate competition when linked to sufficient market sizes. In the case of small markets but sufficient inter-competition, politics can lower the critical mass of needed markets by providing the necessary infrastructure. Stringent political strategies such as price monitoring and access regulations are required when the market demand is too small and the inter-competition is not sufficient.

## 7.2.8 The role of politics for the governance enabler

Governance has emerged as the mediating platform by which the stakeholders of the Logistics City-Cluster are informed, guided and coordinated in a collaborative manner. Support or stimulation for the system must be holistic and is linked to the public and private sector. Hence, political decision making and its power are clearly associated with governance. Of importance is the balance of private and public contributions within governance systems that is associated with the political system and its attendant values in which the cluster is located. These factors will determine the final organisation of the governance system and as a consequence the financial funding and power sharing arrangements of the two factions. The participants echoed:

*Both the private and public sector play an important role in a governance system. ... What happen when the companies say we ... don't want to spent money to keep the green areas and we don't want to spent money for maintenance? The government then ... has the possibility to take some decision against the opinion of the companies for the greater goal of the 'Freight Village'.*

Certainly, aligning strategies between many stakeholders and bringing them together in a workable management structure is not easy. Consequently, the presence of a strong political determination is a natural precursor for the creation of a collaborative governance model for cross-functional activities. The responsibility of governments for a sustainable regional system and the understanding of the macro notions, rather than a micro-economic focus applied by private businesses, appeared to be the main driver. For instance the local authorities associated with Hamburg initiated the 'Logistics Cluster Initiative'. They also provided the basic developmental funding for the first years, which as planned would be progressively reduced and eventually counterbalanced by the private sector through the setting of premiums. These notions are indicated in following statements:

*Without the determination and the commitment of the government there would be no governance body. The Hamburg Senate provides the basic funding; however they will slowly reduce their contribution since the companies have to pay membership fees. (Tr.)*

*[T]he government initiated 'Aragon Exterior', a branch of the state government, which attracts FDI and companies ... We now cooperate and coordinate with them for the logistics sector. ... For example, when I bring logistics executives from all around the world here, I arrange meetings with 'Aragon Exterior'.*

On a micro perspective, the co-ordination of multi-stakeholder activities can reduce duplication and can avoid opposing activities associated with the base and functional enablers. It is in this regard that authorities as one of the stakeholder's fractions, has a greater influence within the governance structure in some of the enabling elements than in others. These perceived core areas are commonly linked to the education of

workforce, research or infrastructure development. The following comments support this notion:

*The government has played a very interesting long term planning role regarding this research centre. ... But, the government also has a very critical role in regards to the education of the workforce ... and the infrastructure development. You can see their dominance in these sectors within the governance structure.*

*Well, you have to look at where the Senate could have opportunities to exert influence, which is reflected in the governance body. Of course, the Senate's involvement is stronger in the area of infrastructure development and research initiatives. (Tr.)*

The core role of governments is being a natural precursor to the creation of a collaborative governance system. The influences on the setup are manifested through a strong political determination and financial stimulation. The bridging of the multi-stakeholder system for current and future development leads to the continuously modification of better overall policies, regulation, direct and indirect subsidies for all enablers that then are enacted by the government. The balance of the public and private sector within a governance system is determined by the political and cultural systems with its attendant values, norms and beliefs.

### **7.2.9 Concluding the influence of 'Politics'**

Political factors, which must also take into account the needs and well-being of other constituents in the administered area, include such inducements as direct or indirect subsidies, policies, regulations, enabling laws, scholarships or research or education funding. Although authorities influences all enablers, it emerged that the government plays a particularly role in areas where the private sector is traditionally not able or interested to act in. This is based on the fact that single or even a group of private stakeholder are only capable of partial investment and implementation or have limited appeal since they might share a positive outcome in an unproportional manner.

Long term strategic focus of governments on the logistics sector is vital to implement the right tools. During the interviews, respondents reflected on government actions that are seen as favourable, and therefore influenced the development of the Logistics City-Cluster in a positive way. Despite this clear evidence, one warning must be sounded. Clusters will not be enhanced or sustained in the long term if industry is not encouraged to increase productivity and efficiency. This can occur if there is exaggerated government assistance to inefficient sectors in the form of direct and indirect subsidies without stipulated requirements for changed practices. Inappropriate government assistance will reduce developmental pressure and create a climate of dependency, which will do more long term damage than good to the cluster. This

situation can occur if a government attempts to win short term support from industry and its workforce in the face of an impending election. Indeed, short-term contributions to growth and prosperity can make long-term planning problematic and may not ensure success.

Finally, it is important to emphasise that to follow the strategies of other regions or nations might not be a sustainable solution, since each cluster and its associated political system have their own requirements. For instance, the successful collaborative governance system that has been established in Hamburg would not be appropriate in a significantly different political environment such as China or Spain. The emerged notions, of the 'Politics' category, are indicated in Figure 7.2-1.

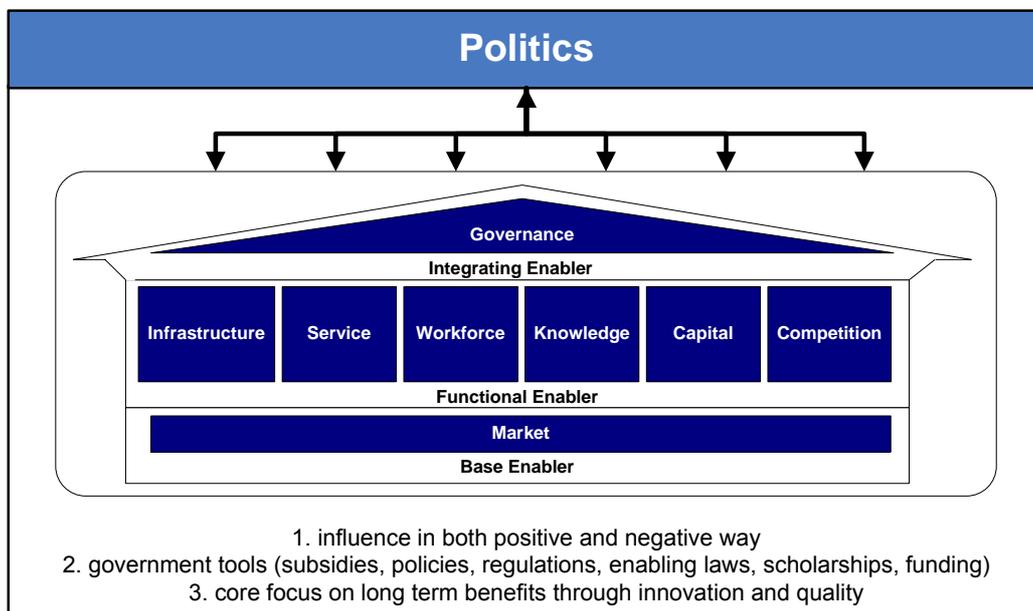


Figure 7.2-1: Politics as an influential factor

### 7.3 The influence of geography on the base and functional enablers

In the literature review, it was observed that geographical conditions and characteristics have an influence the setup of a Logistics City-Cluster. Whilst the notion of geography was not included in the preliminary framework as an individual category, a question was introduced in the interviews to facilitate a clearer and a more sophisticated understanding. As a result, the interviewees unanimously agreed that geographical considerations influence the setup and development of Logistics City-Clusters. In particular, it was argued that the geographical location influences the **accessibility to markets**, and therefore the developmental direction of a cluster. Further, the geographical conditions **determine directly or subtle the characteristics**

**of the functional enablers**, especially logistics infrastructure and services. Indeed, geography is worthwhile to be a category in its own right, and consequently the importance of geography as a market accessibility factor, its influence towards the functional enablers and the notion of **geographical past dependency** will be described in the next paragraph.

### **7.3.1 Geography as an accessibility factor to the markets**

Logistics City-Clusters have traditionally developed around trade gateways, whose basic function is to provide efficient primary and secondary transport connectivity to dispersed markets. The effectiveness of this connectivity will depend largely on the geographic circumstances of the location, with both the *tyranny of proximity* and *topographical conditions* being an unavoidable concern. The geographical advantages of a favourable connectivity to the markets are mainly associated with actual logistics cost, increase of service quality and stronger logistics agglomeration. Hence, the decision to create a Logistics City-Cluster is intimately related to its geographical accessibility, as is emphasized in subsequent quotes:

*[M]any locations are not suitable to be a 'Logistics Cluster', due to geographic conditions. Some only have access to smaller markets and as a result not many logistic activities will locate there. ... Or if the primary connectivity is limited due to geographic characteristics, there will be a time and cost disadvantage. Nobody wants that. (Tr.)*

*Geographic position and conditions influence transport time and cost. ... [T]he cluster has developed here ... [because] it is simply cheaper in the overall cost to unload the freight here rather than further north. (Tr.)*

Thus, favourable geographical conditions make it is easier for logistics operations to achieve lower costs by economy of scale. Further, the response time to the market is decreased, which in the same instance can increase the reliability of services. One major advantage is that favourable topographical conditions reduce the investment and maintenance cost of logistics infrastructure, making the economic feasibility of Logistics City-Cluster elements easier to achieve.

#### **7.3.1.1 Proximity to the markets as an accessibility factor**

Informants indicated that it is seen as an advantageous characteristic to locate a Logistics City-Cluster in the geographical gravity point of retail/wholesale and manufacturing activities. This notion is clearly informed by the proximity to markets as an accessibility factor. However, the notion of proximity to markets is complicated by (i) the various quantity and quality measures for markets, (ii) the dispersed locations of the markets and (iii) various logistics strategies. The general understanding of market proximity is addressed in these statements:

*We have this enormous urban centre here ... that has to be catered for. Of course this requires adequate infrastructure and ... companies. ... Thus, not surprisingly, a large logistics centre has developed due to the geographical ... proximity to the market. (Tr.)*

*Due to our geographic position in Europe ... we have an enormous advantage compared to many other locations. We are able to serve huge markets efficiently. ... Certainly, setting up an EDC in Finland does not really make sense. (Tr.)*

The quality and quantity of markets play a major role for investments and development of Logistics City-Clusters. That this is of real concern is currently shown in Europe. The integration of several eastern countries in the European Union led to debates about the most appropriate centres for new logistics clusters. At a simplistic level, the opening of such a vast region would imply a significant shift of gravity centre based on quantity. However, in the light of the more subtle arguments associated with a combination of quantity and quality measures, this does not necessarily mean redefining new geographical centres. It was observed:

*Zaragoza is ... located in a strategic place. ... [C]lose to population ... and right in the centre of economic gravity. In a 300km radius we connect to Madrid, Barcelona, Bilbao and Valencia. ... That comprises 22 million people and 68% of Spain's GDP.*

*One of the challenges for us is Eastern Europe. ... [L]ots of land and smart people, centrally located so it is competition for locating logistics activities and manufacturing.*

*[W]hat a lot of ... people say, is that the EU enlargement, will change the logistic gravity point from Rotterdam into the area of southern Germany. I don't believe that. ... [W]hen the 10 new EU countries [joined], the ... population surely increased, but their ... buying power is not as important. ... That means still most [of] the money will be spent here.*

The geographical gravity point of the two market segments are not necessarily the same and their individual centres can be considered as suitable locations or, if combined, as a single advantageous location. In an environment where the production of consumer goods has been largely outsourced, the import gateway itself can be reframed as the manufacturing market that links to retail/wholesale. Hence, Logistics City-Clusters can develop around those defined manufacturing and retail/wholesale markets or in a suitable location that connects the two dispersed market segment. An example of this tension is the location of DCs, which can be established close to the manufacturing place, the gateway itself or the end consumer. Indeed, the question of proximity depends on various economic factors, as is evident in these comments:

*If ... it is produced outside Europe then you can consider the harbour as the factory. So it is obvious that in the area of the harbour you will find logistics centres. ... One of the biggest factories in the sense of serving retail markets in Europe ... is the seaport of Rotterdam.*

*80% of all the EDC that have a manufacturer outside of Europe are located in the 'European Logistics Banana'. ... That is logical ... [since] in this area of approximately 500km [radius] ... you find 215 Million people with money.*

*The manufacturing site, the port and the consumer market are all the possible location for DCs. ... The location is very much related to the cost factor and the optimisation of transport functions. Here you can react faster because you are closer, ... but here you have the transport options to bring it to all markets.*

Another factor is the commodity itself. For certain kinds of goods, the time factor is critical. Consequently, a closer geographical proximity to the markets is favourable to reduce lead time and risks. Consequently, it is understood that geographical proximity to the markets is not a constant factor since different commodities will have a different definition of proximity. This is echoed in following quote:

*For some goods, time is less important than for others. If it is food ... you can't afford moving for to long. So you will find the markets in a range of 100km to the warehouse. ... The port area is an excellent solution for expensive products with a European wide demand. A good example is medical devices that are required on a European scale and are demanded just few times a year.*

The third notion regarding geographical proximity are logistics management strategies. For instance, it is common that strategies like central fulfilment and central control favour few logistics centres. These are then located in the geographical economic centre of gravity, based on quantitative/qualitative aspects and market commodities. However, it was observed that recently, the established practices are shifting more towards a less centralised strategy, which then implies that the logistics activities are becoming more decentralised. This results in an increase of possible market gravity centres that are suited in terms of regional accessibility. Clearly, logistics strategies can favour or hinder the development of clusters in particular locations, as is reinforced by the participants:

*[T]hey moved up to central fulfilment and central control. That is the EDC. Now you see a change. ... [T]hey did not want to lose the central control, however going to decentralise fulfilment. ... [T]he logistics leaders are moving into this direction. This is accomplished by merge in transit, satellite warehousing and creating DCs on a more regional level.*

*The disadvantage is that we are far away from being the centre of gravity in Europe in terms of a single EDC. ... [However], serving the south European market that is what we are very good for and this suits logistics companies or retailers.*

Indeed, clusters are more likely to emerge in the market gravity area, but it must be emphasised that the geographical gravity point has a dynamic and complex character and depends on a number of specific location factors.

### **7.3.1.2 Topographical conditions as an accessibility factor**

The topographical characteristics of a region determine the accessibility to the markets and have led, in most instances, to the establishment of trade nodes. Hence, topographical conditions can hinder or support the agglomeration of logistics activities. For example, deep sea water access, which does not require significant dredging, will

favour the maritime transport mode and a seaport development. Or for an inland location that has no waterway access, the topographical conditions only permit international rail and aviation connectivity. Certainly, topographical conditions that allow international accessibility to markets and mass trade flows of goods are supportive, as is indicated:

*[N]o logistics hub will be established in the Alps. Though they are in a very central position in Europe, the Alps are a geographic obstacle that makes efficient connectivity impossible. (Tr.)*

*If you look at the biggest seaports ... you will find that these are mostly at locations where either the maritime location is maximised [such as] ... Singapore or where the hinterland location is maximised like in Hamburg.*

*There are highways as well as the regular cargo rail that connects [to] Barcelona, Madrid, Bilbao and Valencia. This infrastructure was developed just because Zaragoza is inland.*

In many centres where the primary mode was developed in conjunction with geographical preferences, it is now critical to focus upon the appropriate development of secondary connectivity that links to the markets origin and destination. Consequently, topographical conditions play a key part in determining how efficiently goods can be dispatched to and from the local and regional markets. This is well known by the participants:

*[T]here is also the issue of reaching the local and regional consumers. ... [Y]ou have to ship goods from Asia to Europe first, but then it needs to go further into Europe ... to serve secondary nodes. We are lucky here because we can utilise the rivers that allow efficient transportation. That's why we are such an important logistics location.*

*With regard to inland waterway navigation, it would be better if our port were located further south, since it would be more central and improve the cost advantage for inland barges. But the Rhine-River limits this due to its depth, locks and bridges. These geographic factors enable us to be a leading 'Logistics Cluster'. (Tr.)*

Clearly, topographical characteristics and conditions predefine accessibility to local, regional and global markets by favouring the appropriate primary and secondary connectivity. This, on the other hand, will determine the quantity and quality of trade and logistics activities. Indeed, the more the topographical conditions favour a location towards particular transport modes, the more likely it is that sophisticated gateways will emerge, which than can evolve into Logistics City-Clusters.

### **7.3.2 Geography and its influence on the functional enablers**

Geography strongly influences the infrastructure and services of Logistics City-Cluster, and due to the dynamic character of the system, this affects the other functional enablers in a subtle way. For example, if a given location has open sea access it will most likely establish a seaport as the core trade gateway, with perhaps a navigable

river system or rail tracks as a secondary infrastructure option. It follows immediately that this infrastructural setup defines the type of direct logistics services offered, such as seaport transshipment and maritime freight forwarding. Subsequently, this leads to the establishment of maritime focused support services, workforce, knowledge creation and tailored capital. Obviously, the competition within the Logistics City-Cluster and to other maritime logistics hubs is affected. It was noted that:

*[An] important factor, especially for our seaport, is the river Rhine. This geographical factor is very attractive due to its mass transportation function into the mainland of Europe. The logistics services and workforce is built around these factors.*

*Well, the geographic conditions led to the development of the seaport. Then the associated services emerged and many other companies followed, which led to an internal competitive situation. ... Certainly, education was geared towards the maritime location, and now the logistics research sector is growing. (Tr.)*

Further, the topographical factors of a location towards local and regional markets still determine the connectivity mode and therefore the logistics and supporting services. For instance, Duisburg as an inland cluster has the advantage of being in the centre of strong economic markets. The key topographical feature of Duisburg is the navigable river 'Rhine', which functions as its primary connectivity. In contrast, Leipzig, which is perfectly located in the middle of the European Union, does not have convenient access to navigable water, and therefore efficient rail and aviation networks were developed. Examples are quoted by the informants:

*One of the reasons why Leipzig became a logistics hotspot is that it is located in the middle of Europe. It is in the middle of an emerging economic system. They have for example BMW and Porsche there. It is also close to Dresden, another emerging manufacturing spot.*

*We have this enormous urban centre here. ... Thus, a large logistics centre has developed due to the geographical ... proximity to the market. ... Because of the 'Rhine' river the inland waterway port has been established. The hinterland connections are, of course, directly connected to the inland waterway port. (Tr.)*

Indeed, the functional enablers are conveniently suited to the prevailing geographical factors, such as the workforce and research centres in Zaragoza do not focus on the maritime sector as Hamburg, rather on aviation and rail. Hence, clusters have a different setup of the functional enablers as a result of geographical factors. However, they share various commonalities, such as road and rail infrastructure, warehouse activities and the general logistics and supply chain services.

### **7.3.3 Geography a past-dependent factor**

In various situations geographical influence has tended to be a past-dependent factor. Whilst there was geography which informed the historical choice of a trade centre

location, this influence is no longer the core driver for a modern Logistics City-Cluster. The role of growth and reinforcement is taken over by more sophisticated attributes. This somewhat anti-intuitive notion is indicated in following quote:

*Geography tends to become a past-dependent process. ... Indeed the location has been founded long time ago due to geographic conditions, because the 'Elbe' river is a perfect transport corridor, but also to ensure a reliable crossing of the river. That way trade networks and corridors were created in all directions. Certainly, nowadays geographic conditions still have an influence; however other factors are much more dominant for this 'Logistics Cluster'. (Tr.)*

A key issue here is that the requirements of a modern cluster are more demanding and that technological innovations or market shifts turn the geographical factors into a non-constant factor. For example, Hamburg's geographical location and its topographical conditions are not perfect anymore for its primary maritime connectivity. This is because its long river distance to the deep sea requires significant resources for upgrading and maintaining to allow modern ships to access the seaport. Here then is the paradox. The advantage of past geographical factors has led to an increase in the quality and quantity of infrastructure, logistics companies and its supporting businesses. In such situations, more social infrastructure is developed, again attracting new business which will require housing and education. This resulted in the creation of a strong cluster in the face of an apparent lack of topographical advantage, suggesting that more sophisticated factors have overridden the importance of ideal geographical factors. This inexorable type of development is referred to as a 'self reinforcing cycle' and respondents were insistent that this was of key concern:

*There once was geography and ... the cluster started to emerge. [Then] the cluster started to reinforce it self because the quantity and quality of infrastructure improved. These ... improve[ments] then again reinforced the cluster. So eventually you end up in a past-dependent process.*

*If you would redraw the map and start from scratch would you built a port in Hamburg? No. ... It is to far away from the sea ... and to much in the City-Centre. ... Hamburg has invested in rail, road and port infrastructure. All the companies are here. Hamburg means top quality and knowledge. It is an asset where it is and you cannot redraw the map. ... They definitely don't have the best geographical factors anymore but what they have is quantity, quality and long traditions.*

In specific cases, the benefiting role of geography has fully inverted over time and this has led to the disappearance of particular connectivity and gateway functions. However, due to the reinforcing cycle, the high-value services that were associated with the past gateway function are still flourishing. London is an excellent example, where a strong past-dependency towards the earlier geographical factors favoured maritime transport. Whilst the maritime gateway disappeared, particular maritime

activities in London are still dominant in the world, including ship broking, maritime insurance and maritime publishing:

*London ... in the past was based on the maritime function. The port has disappeared, but all the ties are still there. ... [These] relate to 'Lloyds of London', all kinds of maritime consultants, ship agents, cargo agents, ship insurance or specialised publisher. This was not possible without the operational functions earlier.*

Indeed, a particular geographical strength might disappear due to innovation and economical shifts, but at the same time a new geographical strength can emerge. In this context, informants provided better insights when discussing the shift of geographical advantages for Hamburg. Further, it emerged that the new emerging Logistics City-Clusters, such as Zaragoza, strongly advocate their current geographical factors and see these as the major role in attracting logistics services. These two notions are shown in following quotes:

*As far as seaward accessibility is concerned, we are not in the best position anymore since the large ships have trouble going up the 'Elbe' river. ... But, on the other hand we have a competitive advantage due to the fact that we are located so far in the hinterland. ... It is the transport on land that drives the cost and if you save hundreds of kilometres on that, you lower the transport costs along the whole chain. ... That means our disadvantage of being too far in the hinterland is really a competitive advantage. (Tr.)*

*Zaragoza is located in a strategic position in Spain. We are in the middle of the way between Barcelona and Madrid as well as between Madrid and Valencia. ... We want to take advantage of that geographical situation and communicate this benefit widely.*

Interestingly, in Zaragoza the first stages of sophisticated attributes are already appearing, such as with first class logistics research institutes and education facilities. Although these attributes are still in the early development stages, it will drive the future growth since the circle of reinforcement has already begun.

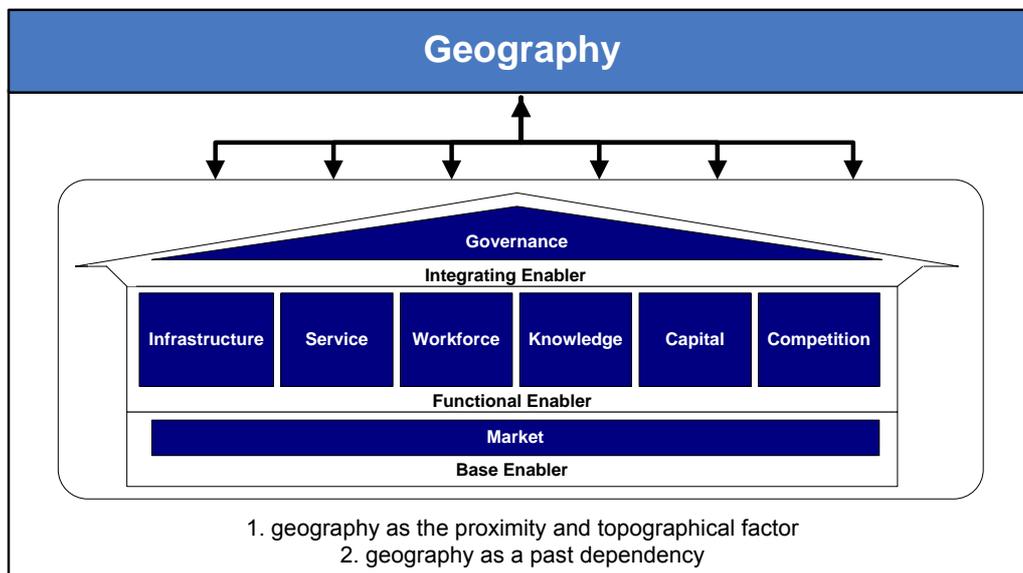
### **7.3.4 Concluding the influence of 'Geography'**

Geographical location and topographic conditions are core influential factors on the market enabler. The geographical proximity to markets appeared as an important determinant, since being closer to the demand implies obvious accessibility. Indeed, the gravity-centre can differ, because of the dispersed location of markets and its various quantity and quality measures, but also due to the various interpretations of proximity on the commodity level and different logistics management strategies. These can favour diverse locations; hence, there can be no single perfect location. Further it was found that topographical conditions favour and predefine accessibility to local, regional and global markets. Consequently, advantageous market proximity and favourable topographical conditions strengthens the agglomeration of logistics activities due to lower logistics operational and infrastructure cost, decreased response time and

increased reliability. Consequently, the emergence of a competitive Logistics City-Cluster is given a greater chance.

Certainly, the geographical conditions strongly influence the functional enabler. In the first instance geography will predefine the transport modes that will subsequently determine the gateways. The infrastructure will then define the type of direct logistics services and their required supporting activities. Subsequently, due to the inter-relationships of the enablers, this influences the other functional categories, such as the workforce education or research activities,

The final observation, which is more of a pragmatic concern, relates to the past-dependencies of geography. Whilst geographical conditions are critical for the development of a Logistics City-Cluster, these have a dynamic character resulting from technological and socio-economic changes. Therefore, it is not surprising that the clusters, at some stage, will move beyond the basic geographical conditions. It appeared that the quality and quantity of the enabling system is the key for the Logistics City-Cluster development. This is said notwithstanding the fact that the geographical factors are a strong asset and must be played as trump card. These emerged notions, of the 'Geography' category, are indicated in Figure 7.3-1.



**Figure 7.3-1: Geography as s an influential factor**

## 7.4 Concluding the 'Influence' category

The influence of both, politics and geography, on the enablers and therefore the setup and development of a Logistics City-Cluster can be either obvious or subtle and, indeed, emerged to be mutual. In particular, each of the eight enablers can be influenced by governmental tools and at the same time, the enabler will influence the

political process. For some, elements such as infrastructure development, workforce education and knowledge creation, authorities are a very important stimulator, since those are historically areas that the private sector has less space to act in. Those should be more of a focus for direct support, since innovation and education will increase the sophistication of clusters. Certainly, it must be clearly recognized that not all government actions are of a positive nature for the development. Governments as a pure supporter role, in the form of subsidies or protective regulation, should not be emphasised, since it takes responsibility away from the logistics industry. It makes the logistics sector more depended on the government, will reduce the necessity of efficiency and can be misused as a risk-lowering facility. The influence should aim for long term goals and should not be aimed at short term success. Most important is that governments need to understand that the enablers have mutual relationships and interdependencies. Hence, influencing one enabler will ultimately have an affect on the other enablers. Thus, authority's role in the 'Governance' enabler, which aims to align activities as a system, is critical.

Geographical factors regarding proximity and topographical conditions have a strong influence on the accessibility to local, regional and internationally markets. Further, the nature of these geographical factors translates into particular logistics infrastructure and therefore impacts logistics operational micro setup. Essentially, due to the interdependencies of the enablers, the influence will spill over to the other functional enablers. Significant for a cluster is that favourable geographical conditions result in lower initial investment cost, better response and transport times, lower operational cost and increased reliability of logistics activities. Thus, the chance of a Logistics City-Cluster to develop and grow is increased.

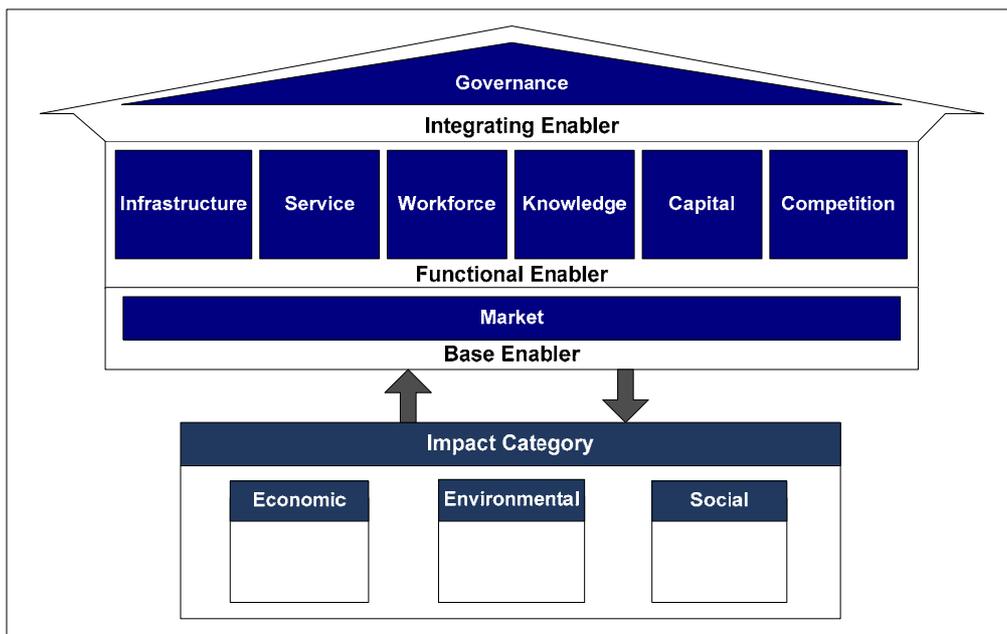
The core notion of the influential factors were transformed into statements and tested in a questionnaire. This was sent out to high profile stakeholders in Europe and the Asia-Pacific region and the results are presented in Chapter 10. Prior to this, Chapter 9 will discuss the impact based on the notion of sustainability. Thus, it details, in a qualitative manner, the effects of Logistics Cluster-Cities on the regional economy, social effects and the environmental consequences.

# Chapter 8

## Delphi Round II: Explication of the impacts on the region

### 8.1 The impact of a Logistics City-Cluster on the region

In the preliminary model, a category named 'scope' was introduced and this conception was tested in 'Round II'. The questions were aimed to establish a comprehensive understanding of possible values of Logistic City-Clusters in the context of sustainable regional growth. As introduced in Chapter 5, the central meaning of this category has changed from the 'Scope' of a Logistics City-Cluster to the 'Impact' upon the region, still focusing on the **economic**, **social** and **environmental** perspectives (Figure 8.1-1).

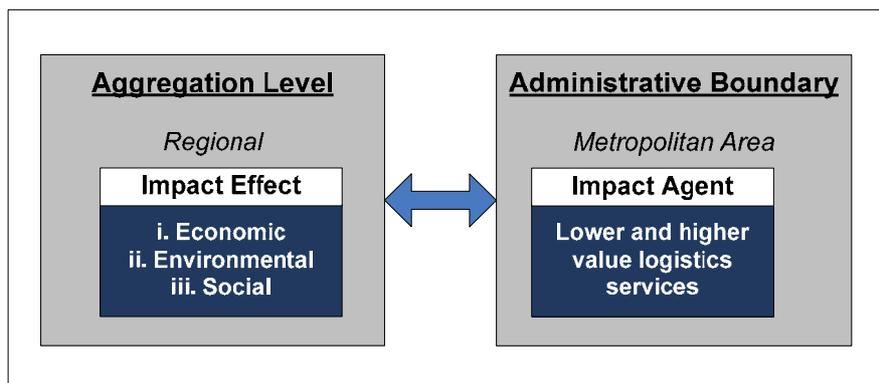


**Figure 8.1-1: The impact categories and its sub-segments**

Impact is understood here as the effects within a region that occur due to the existence of the Logistics City-Cluster. However, before discussing the impacts there are three core notions that arose during the analysis which need to be addressed. First, in any discussion regarding regional impact, there must be a clear definition of the impact agent to enable a comprehensive understanding of the possible effects. In this context, the core activities of Logistics City-Clusters are referred to as the impact agent. As discussed in Chapter 6 these are classified as higher and lower value logistics services.

Second, there must be a clear boundary for the involved activities when conducting an impact analysis. In this regard, the administrative boundary of the metropolitan area is suitable for this impact analysis, because logistics activities are widely dispersed and historically grown. Consequently, all core activities that take place within the metropolitan administrative boundary or are very closely linked, although located slightly outside, should be considered.

Third, it appeared that the impact of logistics activities associated with the metropolitan area can be discussed on various aggregation levels such as the local, regional or national stages. Indeed, whilst the importance of the logistics sector in the wider economic aggregation level decreases, the accumulated impact of a Logistics City-Cluster on the national level will generally be larger than the local effects. For this investigation the focus was set on the understanding of possible impacts on the regional level, because of the defined research objective as described in Chapter 1. The approach for this qualitative investigation is illustrated in Figure 8.1-2.



**Figure 8.1-2: The application of the impact analysis**

The upcoming paragraphs explore in a qualitative manner the nature of the economic and social effects on the surrounding region and the potential consequences on the environment. These rich descriptions of the impact categories provide a critical understanding of the third core research question regarding regional effects.

## 8.2 The economic impact

Round I strongly emphasized the importance of the economic value of the Logistics City-Cluster to the region. In particular, it was stated, both in literature and the initial interviews, that economic values are the main driver for the establishment of a Logistics City-Cluster. While the meaning of the category changed, the sub-categories of preliminary model were amended only on a minor scale. Whilst the two earlier sub-categories of *employment opportunities* and *generation of income* were strengthened

by Round II, the notion of income is now separated into the *revenue contributions to the government* and the *income for the workforce* due to their distinct effects. The preliminary GDP sub-category has been slightly amended and is now labelled as *value-added to goods*. Although innovation, an element of the preliminary scope category, is generally accepted as a benefit of agglomeration, the participants have not perceived it as part of the economic impact. Instead, innovation is recognised as an element of the 'Knowledge' enabler.

### **8.2.1 The significance of employment opportunities**

The first notion that emerged regarding economic impact was associated with employment opportunities. In hindsight, perhaps, this is not a surprise, since it is the most common applied measure regarding regional impact. However, it surfaced that logistics as an important driver of regional employment only became apparent in the last two decades. Indeed, regional authorities preferred industrial or commercial activities that have a higher employment–area ratio than the logistics sector. In this context, respondents from Hamburg referred to quantitative studies which indicate that logistics activities generate around 30-80 employees per ha (Regionomica, 2005). However, industrial activities are estimated around 100 employees per ha, which can vary significantly, from a high of 400 to a low of 18, depending on the sector (Burmeier et al., 1999). Additionally, high value commercial sectors, such as administrative activities, consulting or R&D, can have up to 450 employees per ha (Burmeier et al., 1999). These notions are expressed by the interviewees:

*[T]he number of employee per square footage for logistics activities is not high. ... Usually manufacturing uses more labour per square footage and attracts more capital. That's why logistics was not attractive for governments. But, that has changed since production has shifted to Asia or Eastern Europe leading to the introduction all kind of value-add services in logistics.*

*Aragon has about 10% of the Spanish surface but only 2.5% of the total population. As you can see there is a bit of disconnection. ... So we can use more land to create employment for the people. The high utilisation of land for employment is not this important for us and favours logistics.*

Despite these ratios, the importance of the logistics sector as a regional employment strategy has significantly increased. The change seems to be related to the fact that business strategies have evolved (e.g. focus on delayed product configuration and customising) and also because classical industrial production has inexorably shifted towards regions having low wages (e.g. from Europe to Asia), which increased the need for transport and logistics. Hence, governments have realised the necessity for new and innovative employment possibilities to participate in emergent globalisation

possibilities and to tackle declining employment. For instance, this trend towards reframing regional workforce demographics was very obvious in the 'Ruhr-Area' in Germany. The decline of the mining and steel sector has forced the government to redefine their economic setup and one of the focused areas was logistics. Indeed, it led to the development of a comprehensive Logistics City-Cluster in Duisburg. This change of mindset is indicated in following two quotes:

*Many jobs in the steel industry and the mines were lost. Therefore, the government was looking for a type of industry that could be built on these particular workforce requirements. ... Additionally, we had a lot of available land. Then of course, there was the strong inland waterway port and good transport infrastructure. ... Hence, it quickly dawned on people ... that logistics is a great thing for the regional economic development. ... Now the logistics sector employs around 600.000 people in this federal state ... which is almost 10% of the overall people employed. (Tr.)*

*It is useless to wait for the big manufactures to settle here. Some of them even moved away to more affordable locations like Asia. This is why we reminded ourselves of what Hamburg's strength consists of, and that is after all the function as a transport hub and logistics location. (Tr.)*

As indicated in above quotes, the process of reframing workforce demographics and economic profile is quite complex. With the decline of dominant economic sectors, regional authorities try to create more sophisticated activities that are built upon regional strengths and the vestiges of the diminishing sectors. Hence, employment stimulated by a Logistics City-Cluster has a linkage to the industrial history of the region. It was found that if a trade gateway existed in the first instance and the location has favourable geographical attributes, the decline of other industry sectors are more likely to be addressed by a logistics-driven economy. Further, an existing blue-collar oriented employment structure and sufficient land availability favour the development of the logistics sector as a regional strategy. This notion is also indicated in comments such as:

*They built expertise in the port industry for hundreds of years. So you don't go into something totally new. That is not logical and is a great risk. Well government and risk, better not. So they stick to what they know and therefore now the focus is on logistics.*

*If you have an airport close by, [you] can ... increase the number of flight movements and the employment rate will go up. ... Great, that is what we do. We have people, we have the knowledge and everybody understands what we talking about. So if some industry sector decline authorities link future opportunities to current strengths.*

In particular, it was stated that the Logistics City-Cluster is a successful strategy that has created employment possibilities, resulting in a significant decrease in the rate of unemployment. Additionally, it was observed that logistics will generate thousands of local jobs in the next years. For instance, it is expected that the 'Freight Village' development in Zaragoza will create up to 14,000 jobs. Moreover, it was commented that the logistics governance body in Hamburg will enable a holistic logistics

development, which favours the creation of 14,000 logistics jobs. Indeed, impact on the employment rate supports earlier reported aims of such logistics-driven regional strategy. The participants noted:

*In Hamburg we have a greater reduction in the unemployment rate than other federal states and that is due to the employment opportunities created in logistics. ... The 'Logistics Initiative' predicts that a further 14,000 jobs will be created by 2015. This can only be achieved either by the expansion of existing companies or by attracting other companies. (Tr.)*

*One of the impacts is the employment possibility created by Plaza. ... [E]very year we create around 1,500 jobs. In the end we want to establish around 14,000 Jobs.*

*All the activities that are demanded by the logistics services, such as temp agencies or specialised insurances ... create additional employment in the region, actually a lot of high value employment.*

As indicated above, beside the direct employment opportunities it appeared that there are further indirect job prospects, which result from supporting industries that are demanded by logistics activities.

## **8.2.2 The importance of value-add for the region**

It appears that the value-add factor is a meaningful economic indicator when discussing the impact of Logistics City-Clusters. In the perceptions of the interviewees, it is commonly understood as the output or gross revenue. However, this needs to be viewed with caution, since it might include unrelated inputs. Consequently, the impact of value-add is seen as the output generated by logistics activities minus the external and internal inputs, as is echoed in these statements:

*[Y]ou look at value-add and postponed light production or customizing. ... Rotterdam is the point of entry for fruits and then you provide value-add by creating juice and put it in tetras. ... [T]he fruits costs you 1 Euro then there are other cost of maybe 2 Euro, but the units of fruits juice you sell is 5 Euro. So you created a value of 2 Euro.*

*The creation of value-add is very important for the cluster. One recent study pinpointed that the value created here is 2.2 billion Euros a year. (Tr.)*

Of particular significance here is that the value-add can be directly linked to the GDP of a region. This can provide information about the contribution of the logistics activities to the regional economy and can further indicate the growth of the sector when compared to earlier reporting periods. Despite the general difficulties in defining the metrics for the logistic sector used for reporting the GDP, as discussed in the service enabler, it is a useful indicator for the economic impact. This is because the indications of increasing and decreasing regional GDP of the logistics industry can be used to support decision-making for not only private investors, but also governments in regards to restraining or stimulating the logistics sector. In the view of the respondents:

*Well, I know the percentage level of value-add by logistics activities regarding the gross product have generally increased here. ... The growth of the logistics value-add is an important impact. It shows the economic strength, which is then reflected by employment, income, tax generation and living standards.*

What makes this discussion more complex is that the logistics activities extend beyond the initial value-add that is directly generated. Hence, the indirect results also account for this category. Certainly, logistics demands support services which then indirectly add-value. This magnitude is acknowledged in following comments:

*Importance is that you can't pin everything directly on logistics. Some of the created value is indirectly created by the demand of logistics activities. ... ICT, ... advertising, insurance..., accounting, maintenance ... these are the type of services ... that create additional economic value for the region.*

The most important aspect of the value-add impact is the fact that it reflects the regional economic strengths, which determines the regional assets regarding the regional employment and income. Indeed, the share of value-add created by logistics activities in the region hosting a Logistics City-Cluster is much higher than the national average.

### **8.2.3 Tax and duties as revenue originators for authorities**

The revenue streams for governments due to tax generation are perceived as having a crucial economic impact. Tax revenues due to logistics activities are trade tax, value-add tax, income tax and payroll tax. Certainly, the more logistics activities that are located in the metropolitan area, the more the tax will be generated. Hence, the logistics sector is a very important direct revenue generator for regional authorities. Indeed, the indirect impact due to supporting activities also accounts for this sub-category. An important facet here is that the higher value-add logistics activities have not only an increasing impact on the value-add and employment, but also on the tax revenues. These notions are echoed in following comments:

*There a lot of tax income generated by the logistics activities. Just think about the value-add tax or income tax. ... Yes having the higher value-add activities makes a big difference for the governments, since they will generate higher tax revenues.*

*[T]hey have to be in the area of the county, so they don't lose their income from municipality trade taxes and property tax. ... Yes, then there is the income tax, linked to the jobs.*

*The mayor once mentioned that the city generates approximately 1/3 of the overall business tax directly from port activities. (Tr.)*

Despite tax revenue being the major income for the authorities, other payments such as government rates and charges are regarded as a direct impact. One of the non-tax payments generated through logistics activities is associated with the infrastructure and

the notion of user-pays systems. For example, the more transport-related logistics activities that are attracted to the Logistics City-Cluster, the higher the impact on the government revenue due to toll payments. Another important revenue factor for the government is associated with import/export duty, because increased trade, an effect of sophisticated Logistics City-Clusters, will feed back to the government in the form of these duties. In this regard, informants suggested that:

*[T]he local government is asking [for] money from the actual user, because they need to maintain the infrastructure. ... [Therefore], user-pays systems for roads ... are introduced ... [or] the ships arriving in the harbour have to pay ... [harbour dues].*

*If you have to pay import duties, you will not get them back. If the import duties are 10% and the value is high, it's too bad especially when you have to ship your goods outside of the EU again and pay tax a second time. ... The import/export duties create ... income for the government.*

However, it must be understood that the distribution of the tax and duties generated by the logistics activities might not fully contribute to the region itself. Instead they might be centrally allocated or distributed to other states and municipalities. This certainly depends on the on the nature of governmental and legal system, as it is indicated in this comment:

*[T]here is always one condition from the city hall. You have to stay in the county area due to tax reasons. If the companies settle outside the administrative boundaries, another county will receive the tax income instead.*

*It's not as if all taxes that are generated here, are allocated for this region. Certainly, some taxes are managed by the federal government and others directly by the state governments or the municipalities. It always depends on the type of tax or levy. (Tr.)*

A further finding regarding tax and duty income generation is more subtle and associated with the governments' influence towards the enablers. The increase in tax revenue without changing the regulation is an indicator for a solid expansion of the economy, here the logistics activities. This will put governments in a better position to raise funding in areas such as infrastructure, social services, education and research, as is discussed in this comment:

*There is this study by the 'Regionomica', who have calculated the sum of business tax generated for Hamburg due to logistics activities. Well, the more revenue the city has, the more it can support the logistics sector in the areas of education, research, infrastructure or in form of creating a governance structure like our 'Logistics Initiative'. Consequently, Hamburg becomes more attractive and more companies locate here, which results in more revenue for the government. (Tr.)*

Hence, the enabling category in all its facets can be enhanced, which further attracts economic activities that generate more tax and duties for the governments. On the other hand a decline in the logistics activities, indicated by a decreasing share of the GPD, can restrain public spending for the enabler and reflects weakening growth.

## 8.2.4 Income for the workforce

The notion of workforce income has appeared as an economic impact and is perceived as salaries, wages and any other payment to employees associated with the logistics sector. Interestingly, the major economic impact of income is seen as the induced flow-on effects towards the regional economy. Income for the employees from the logistics sector will result in partial spending on regional goods and services, creating additional jobs, value and revenue for governments. Certainly, the more income that is spent in the region, the greater is the opportunity for its growth. The interviewees stated:

*Well, one indication of the economic impact is the number of jobs and their associated income. The bulk of the income is generated in the blue collar area, such as in the warehouse and transport sector. ... But, there are also the income groups comprising the commercial and executive positions. (Tr.)*

*Then there are the so called induced effects. What I mean is that if someone locates here and works in logistics, they will go to the bakery and the butcher. Hence, this generates more value-add. (Tr.)*

*The most important effect of the income for the workforce is that it stimulates the economy. The spending of income for food, entertainment, cars and so on creates further employment and tax for the government.*

It seems that regarding the level of income, the logistics service-related jobs are fairly well paid. Obviously, in certain service sectors such as banking, the employees are well remunerated, because to be employed in this area, a higher level of education is necessary. As it was described earlier, the majority of employment possibilities in a Logistics City-Cluster are within the unskilled/semiskilled sectors that do not need complex and costly higher education. Therefore, taking the level of education and possible income into account, the logistics sector is fairly well paid, as argued:

*If you look at logistics compared to other services industries, logistics is much better paid. ... Truly there are low paid jobs, but these are relatively well paid when you look at education level. We had some good studies about that.*

*Well the boom in the logistics sector is reflected in the salaries. ... The real income in this sector has displayed a growing trend over the last few years. (Tr.)*

Income and its relative level plays a major role for the economic impact category due the successive spending rounds in the region of the household receiving wages and salaries from the logistics industry. These ongoing rounds of economic stimulation will create demand in other sectors, like a chain reaction, that creates further employment and value, tax and duty revenue for government.

### **8.2.5 Concluding the ‘Economic’ impact category**

The observed economic impacts of the logistics activities on the surrounding region can be classified in four categories. First is the creation of employment for the region. Whilst the job density per hectare is not very high compared to other possible commercial and industrial sectors, the logistics sector is seen as a useful and innovative employment strategy because of changing business practices and the need to participate in globalisation opportunities. Indeed, this employment strategy is related to the past characteristics of the region such as the dominant employment sector or existing trade gateways.

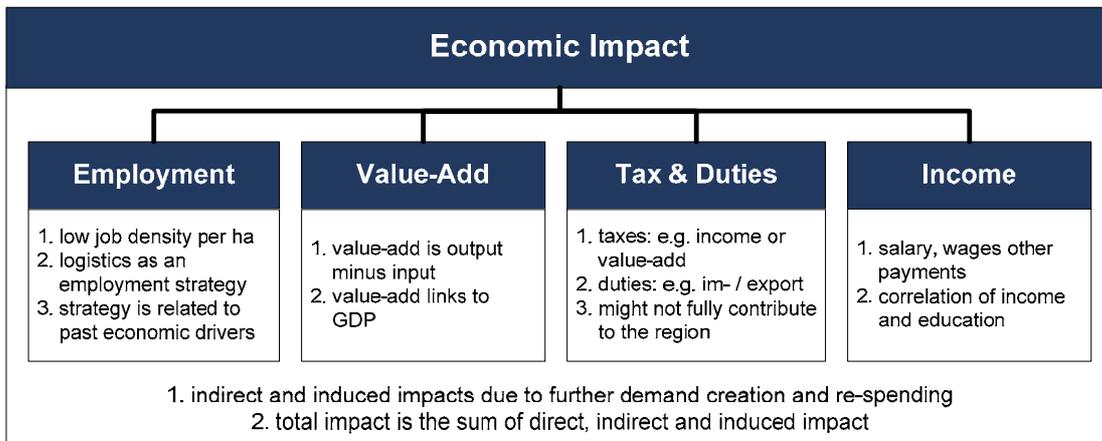
Second is the value-add to goods passing through the area, seen as the output minus the intermediate inputs. This value-add measure can be directly associated with the GDP of a region to facilitate an understanding of the impact on regional economic strength and growth, and it is this pragmatic understanding can be used to support decision-making processes to restrain or stimulate the logistics sector.

The third sub-category contains the revenue streams for governments due to tax and duties linked to logistics activities. Taxes are understood as trade, value-added or income tax, whilst duties are non-tax payments such as income from infrastructure fees or export/import levy. However, these revenue streams might not fully contribute the region itself, since they can be distributed to other government levels.

Fourth is the level of income for the workforce that is seen as salaries and wages. The core economic impact here is that the income induces flow-on effects that result in further value, jobs, tax and income, since the payments received by employees will be partly spent on local and regional goods and services. Certainly, the higher the income within the logistics sector and the more income is spent in the region, the higher the re-spending rounds will be and the greater the growth opportunity of the region.

Beside the direct logistics impact and the induced household spending effects, there are indirect job opportunities, value-add creation, increased government and workforce income that are linked to the demanded supporting activities. Imperative here is that each successive round of economic stimulation, through indirect and induced effects, is smaller than the preceding round. This is because the demand satisfaction of required goods and services will also take place in other regions. Clearly, the total impact is the

sum of direct, indirect and induced impacts. The four subcategories and their properties are indicated in Figure 8.2-1.



**Figure 8.2-1: The 'Economic' impact category**

### 8.3 The environmental impact

Round I investigation indicated that the environmental impact towards the region created by the logistics sector was perceived as a negative factor hindering sustainable development. Whilst this understanding was strengthened in Round II, preliminary sub-categories and their properties have been slightly amended. First of all, there is the sub-category of *pollution*, which now not only includes the hazards for the atmosphere, but also for water and land surface. The second sub-segment is referred as the *degradation of water and land surface areas*, which only deals with the utilisation of the areas through logistics and the associated reduction of natural habitats. The third element is concerned with the impact of *odour, noise and visual appearance*, induced by traditional logistics services and infrastructure. Additionally, the indication of the preliminary framework that there is an increased focus on environmental degradation is reinforced in this iteration. In particular, there is a growing emphasis on possible strategies at public and industry level aiming to reduce this negative impact. Consequently, the rising *awareness of the environmental challenging situation* induced by logistics activities and the *strategies to reduce the degradation of the environment* are also elaborated in the next paragraphs.

#### 8.3.1 The challenge of pollution

One of the core challenges of a Logistics City-Cluster is pollution, of which the main source is seen as arising from the transport sector. The most common measurement on environmental pollution is perceived to be emissions. One participant for example referred to the statistics department of the European Commission which pinpointed that

the transport sector in the EU generates 44% of the total CO<sub>2</sub> emission (Eurostat, 2003). Indeed, one of the basic functions in every Logistics City-Cluster is road transport, and the vexed issue of vehicles being the main driver of atmospheric pollution is recognised by all participants:

*In general I think logistics has been traditionally heavy on the environment in regards to the CO<sub>2</sub> pollution, especially the transport sector. ... That is the key impact on the environment.*

*You have transport and that ... generates emission. That is not only an issue for road as a core polluter, but also accounts for ships, trains and aircrafts.*

*Congestions on the road and therefore emission are the most discussed environmental concern here. ... Yes truck traffic in Europe happens to be highest CO<sub>2</sub> polluter.*

The perception that road transportation is the strongest polluter needs to be put into perspective. Whilst one ocean going vessel produces more emission than one single truck, the result is reversed when correlating CO<sub>2</sub> emissions with ton/km based on transport capacity. Indeed, this perspective indicates that aviation is the strongest polluter, exceeding that of road, rail and maritime transport. However, whilst CO<sub>2</sub> emission per unit for sea transport is the lowest, there are other significant environmental concerns caused by this sector. Sea transport emerged as a strong polluter regarding nitrogen and sulphur oxide emissions, due to the use of heavy fuel oil. The respondents highlighted that:

*Aircrafts are the strongest polluter when looking at transport capacity and emission. The lowest are the mass transport options such as maritime shipping or rail.*

*Also NO<sub>2</sub> and SO<sub>2</sub> are part of seaports, because of sea ship movement. Transport by sea is very dangerous to the environment in those two kinds of emissions.*

Despite the widely debated issue of emissions, there are other kinds of pollution that relate to water and soil contamination. For example, the maritime sector includes several operational activities that have a harmful impact on the maritime ecosystem. In this context, water contamination is common and associated with heavy metal paint coating, bilge pumping, tank cleaning, waste disposal, lubricants and fuel spills. Beside the harmful impact to the maritime environment, transport and transshipment activities also inflict damage to soil and ground water. Contaminations usually occur along the trade corridors and at the gateways resulting from petroleum, battery acid leaks, used oil, fuel spillage and waste disposal. Respondents noted:

*[S]hipping ... pollutes not only the air, it also contaminate the water. Take for example bilge pumping, the paint coating or the waste they dump into the sea. ... [T]he water in the port can look quite dirty and is does not smell too good. Honestly I would not swim there.*

*Have you ever visited a rail terminal? There are a lot of oil and fuel spills. It's always dirty... even along the rail tracks. ... Or another example is the entire port area. Almost all*

*land is contaminated there. Of course, you cannot hold logistics responsible for all that, but it does play its part. (Tr.)*

*[T]here are always pollution effects during the construction and maintenance of the infrastructure. ... Oh well, then there is also pollution due to the maintenance of the equipment and transport vehicles in the gateways.*

As indicated in the last quote, maintenance associated with particular transport vehicles and transshipment equipment can cause pollution, but is also created when developing logistics infrastructure.

### **8.3.2 Land use and destruction**

Another significant environmental impact is related to the massive land requirements for logistics infrastructure. It was argued that the clearance of the land for terminals and transport infrastructure has an immense impact, since these developments replace green areas with concrete-steel structures. Consequently, the habitats for flora and fauna can be lost on a long term basis. One specific case discussed in the interviews is a possible tunnel development through the Pyrenees to connect Zaragoza with the French rail system. Respondents stated:

*In the port you mainly have concrete and steel. It is definitely not a nature conservation area. It is the same with the large logistics districts in the surrounding areas. ... Any expansion of these vicinities results in a loss of habitats for fauna and flora. (Tr.)*

*We are fighting to dig a hole in the middle of the Pyrenees to connect with the French rail system. ... [T]here are environment interest groups trying to protect a bird hatchery or something else. ... The people ... only see the possible destruction.*

There is not only the degradation of land surface but also of water areas. For example, if no land is available for the extension of a maritime gateway, there is the tendency toward land reclamation from the sea. This can lead to adverse environmental effects such as oxygen shortfalls in the water and distress of the maritime eco-system. Additionally, the waterway infrastructure and the inner harbour commonly need regular dredging to enable sufficient accessibility for the vessels. Dredging means that a huge amount of sand and sea ooze have to be removed, which has a negative impact on the associated eco-system such as lost spawning grounds and decline of the maritime flora and fauna. This environmental impact was common in three of the four visited clusters and caused long debates, as is evident in following comments:

*You need a lot of space to do all this handling. In the case of Rotterdam they do so by conquering land from the sea. ... There are debates regarding the maritime ecological impact such as the distress of fish and birds. But in the end Maasvlakte II will be constructed.*

*[T]he deepening of the navigation channel makes sense from an economic point of view but is questionable from an environmental perspective. ... It means we would get [a] rise*

*in the tidal range ... of around two centimetres. ... Then there is also the hazard for the fish spawning grounds and the increase in the speed of the current. (Tr.)*

It appeared that environmental impact caused by land use and its degradation is not as widely debated as the pollution by the logistics operators. However, the hazardous impact of these activities should not be underestimated due to its long term character.

### **8.3.3 The effects of noise, odour and visual appearance**

The third major environmental effect is related to noise, odour and visual effects on the environment. Logistics activities generate a lot of odour that negatively impacts on the environment in close proximity. Odour is commonly a result of pollution that arises during the actual logistics operations, such as from transport emissions. Additionally, odour occurs during the development and maintenance of logistics infrastructures, such as from dredging or road pavement. The interviewees argued:

*The municipalities, not all of them but most, said: 'No, we don't want logistics. Logistics is dirty, stinks ... and bothers the community.' (Tr.)*

*The paving of roads, that really stinks and pollutes. ... If you close to the port you can really smell the industrial activities or the pollution of the ships.*

Noise is associated initially with the construction of transport infrastructure, because of required geotechnical works and the application of powerful mechanical equipment. Subsequent transport operation raises the ambient noise level. For example aircraft noise arising during take-off and landing along the flight corridors has negative impacts on local noise sensitive receivers. Beside transport, there are other sources such as transshipment activities and warehousing. Those are associated with the handling of the cargo and fixed warehouse noises such as ventilation exhaust fans, forklifts and warning sirens, which can be very irritating for the environment in close proximity. It was noted:

*Living close to the airport is not the best idea. ... If we succeed in attracting more cargo it will even get a lot noisier. ... It would not be wise to grow the city around the logistics area, because hopefully it is getting busy.*

*Then there is the noise from the trucks, which is a strain on the local residents. ... The noise also comes from the warehouses. Depending on the wind, you can hear the warning sirens and the forklifts from kilometres away. (Tr.)*

Impact of visual appearance primarily results from existing logistics infrastructures that. Obviously, the substitution of natural habitats with steel and concrete industrial areas not only obstructs the view on existing eco-system but also disrupts the relaxing character of the area. Additionally, disturbing visual impacts occur during logistics operations in the nodes and along the trade corridors. For example, a gateway that is

operating on a 24-hour cycle has floodlights and high mast lighting. This generates light at night times that potentially has a disturbing affect for any natural environment. These core challenges are acknowledged:

*Nice examples in regards to visual appearance are the shipyards and their huge buildings ... [and] the big rail yards. They don't look really appealing and definitely do not create a relaxing character. ... Also the floodlights in many terminals at night time are disturbing. I don't want to live next to those places.*

*Industrial companies ... now have centralised places. That leaves a more liveable area in the city centre. No more dust and visual disturbance. The area is now used for residential purposes and commercial activities. Yes less noise and the centre looks better now.*

Whilst the direct impact of the odour, noise and visual appearance does not have a strong negative influence on the environment, it has a significant influence on the other impact categories. As indicated in the quotes, these negative impacts can hinder the development of higher value activities and reduce the quality of life for local residents.

### **8.3.4 Rising awareness of negative environmental impact**

It seems that positive macro socio-economic benefits for the region such as job creation compensate for any hazardous environmental impact. Those perceptions, which may represent actually conscious ignorance, are still common in the visited clusters and there is an understanding that this unawareness particularly occurs in emerging regions. It was stated:

*[B]asically that's what it is all about, employment, employment and employment. ... [E]nvironment most the time is not primary rather secondary. ... In Europe you now have to obey environmental regulations. ... In emerging regions it is still only about economic growth.*

The same phenomenon of importance placed on economic objectives also appears at the micro level. There are two major obstacles observed in establishing environmental preservation actions within individual companies. First is the lack of resources to implement and administrate environmental-friendly equipment or management systems. The second obstacle is that companies lack the perception of possible benefits when investing in environmental friendly processes and products, rightfully or not. Certainly, logistics operators are driven by financial metrics to give evidence of benefits to the stakeholders, and the integration of any environmental activity into financial performance measurement is not an easy task. Hence, the lack of clear financial quantification of benefits will reduce the motivation of adapting environmentally friendly behaviour. The micro-economic challenges are argued in following quotes:

*Small companies [commonly] do not have the amount of capital to invest in the environmental friendly behaviour. ... They do not have the deep knowledge and manpower in those kinds of systems and technologies.*

*Regarding maritime shipping we are currently discussing whether to use heavy fuel oil distillates. We are talking about a dramatic increase in costs here. ... In return you have fewer emissions, but how do you present that as a financial benefit to the shareholders. (Tr.)*

*The challenge is that it is quite hard to quantify the positive effects of environmentally friendly behaviour. The management and the investors only understand the balance sheets and profit/loss calculations.*

Despite this observation, environmental awareness within the clusters has become an important issue over the last few decades. In this regard, two core forces were identified: (i) external reasons driven by governments, the public and market sectors; (ii) internal reasons driven by the logistics operators. The major external reason for reducing environmental destruction is the government. The pressure induced by regulations and laws is powerful and can include various types of tools such as taxes, fines and huge liability payments. Hence, the originator of the environmental degradation has to take responsibility by introducing corporate reporting, which allows a clearer understanding that certain environmental behaviour has a financial impact. Another external reason is associated with the pressure resulting from the general public (e.g. environmental interest groups). Publications of non-environmental behaviour can damage corporate reputation, impacting negatively on the business. These two external motivations were discussed by the respondents:

*The government is pushing for more environmentally friendly behaviour, to benefit society of course. ... They influence the logistics industry with their political tools ... which certainly leads to tensions. ... If you deviate from the regulations you can expect huge fines. ... There is also the so called eco-tax which is added on top of the fuel price. (Tr.)*

*You have tough European environmental laws. Rotterdam goes even further and plays a proactive role. ... The port adopted the Clinton climate initiative. We have the goal to reduce 50% of the CO<sub>2</sub> emissions by 2025.*

*[P]eople will get angry if more pollution and noise will be created. So they will pressure the authorities to reduce that. ... [T]o use your environmental performance as a competitive weapon is smart. ... [C]arbon neutral behaviour ... [t]hat is something that you can use as a marketing tool to increase the reputation and strengthen the business.*

There is also an external motivation due to business opportunities linked to customer demands and their ability to catalyse environmental awareness within the logistics operators. Indeed, the more power the market companies have, the more the logistics operator will comply with environmental concerns, in order to protect business. The second reason, the internal motivation of the logistics operators, is associated with productivity improvements or cost reduction. This, even if not intended, can have positive side effects regarding environmental preservation. For example, if a logistics

provider can achieve more output (e.g. ton/km) with the same input (e.g. petrol) less pressure is put on the eco-system. Participants stated:

*Very large firms like Wal-Mart or Johnson & Johnson demand from their supplier and service operator's carbon neutral behaviour. ... If you don't comply with this, you will lose business. So better do it and spent some Euros to generate business.*

*Companies want to increase productivity and thereby also lower costs. Sometimes these measures also reduce environmental pollution. We have, for example, reduced fuel consumption by introducing specific driver training. Thereby we lowered the costs and also reduced CO<sub>2</sub> emissions. (Tr.)*

Notwithstanding the apparent conflict of economic principles and the need to reduce environmental degradation, the current trend of eco-friendly behaviour is closely linked to forced direct and indirect benefits. Direct benefits are cost saving on the operational level or facing lower governmental taxes, while indirect financial benefits are increased business opportunities and lower risk of environmental damages leading to expensive cleanups.

### **8.3.5 Current activities to reduce environmental degradation**

Whilst logistics activities are necessary for every day life and for a region to prosper, it is also understood that negative environmental impact will erode future success. This increasing awareness resulted in various activities to reduce the negative environmental impact taking place in Logistics City-Clusters and is labelled 'Green Logistics'. In this context, two interdependent approaches emerged: (i) new strategies for logistics operations and (ii) environmentally friendly technology. It is indicated in following quotes:

*The topic of emissions will be big in the next years. You have to justify why you create CO<sub>2</sub>. ... The improvement of ... the environmental performance ... can be done both by new strategies such as multimodal supply chains and by better technology.*

*[W]e need logistics but at the same time we have to reduce its negative environmental impact. ... [T]he subject of 'Green Logistics' is slowly emerging. Certainly, there will be technological innovations and optimized logistic processes that reduce environmental hazards, but zero-emission will not happen. Logistics remains a sector that has a negative environmental effect. (Tr.)*

Because transport is the main polluter, it is not surprising that efforts to achieve environmental preservation is emphasised in this sector. It was observed that multimodal transport and less single road transport can make a significant difference due to lower emissions per ton/km. This, however, implies the restructuring of entire supply chains. A company's processes of sourcing and distribution, which is the remit of transport modalities, needs to be adjusted when incorporating multimodal transport. In particular, the processes of facility location and distribution-network design are

impacted, but also the systematic integration of vehicles, transport units and transshipment equipment. Further, the consolidation of cargo is critical, since train, barges and ocean going vessels are mass transport means. Consequently, achieving critical economic mass for transport units and long transport distances are essential. The informants suggested that:

*[W]e are advocates of an optimal modal split regarding environmental concerns. ... Through a clever combination of transport modes, for example including railways and inland navigation vessels, emissions can be reduced. (Tr.)*

*The hubs as the consolidation points have variety of multimodal operators and infrastructure to support greener supply chains. However, it is the balancing of the cargo and transport distance that matters. ... You need a lot of cargo that needs to be transported quite a distance and then at least you can think about multimodality.*

*Multimodality as a greener option is linked to distribution strategies. ... Maybe you should put a DC in central part, in the east and the west of Europe. That should allow enough consolidation to allow trains and barges to operate. But, then there is the question of the final location of the demand. You need to make sure you cover all areas.*

Certainly, the multimodal system is commonly pushed by the governments, perhaps due to the responsibility for infrastructure development that is needed for 'Hub-and-Spoke' networks. More importantly, to achieve the reduction of CO<sub>2</sub> and increase productivity when integrating multimodality, the entire supply chain needs to be considered. Indeed, reducing the negative environmental impact in one part of the system might cause more negative impact in another part, if not considered as a holistic approach. The following explanation is used metaphorically:

*[I]f you negotiated the best rates and the best quality for each piece of the supply chain and add it up, you [think you] would have the best value for the total supply chain. But that is not true because the main thing is how smooth the pieces fit together. ... That means that in some parts of the chain you will not have the lowest cost or highest service. Important is to create the best cost and performance of the total chain.*

Another current approach to reduce emission is to increase the utilisation rate of logistics capacity. This can be achieved by coordinating the activities of different companies. For example, in the maritime and aviation sector so called 'alliances' or 'conferences' provide combined scheduled capacity for a particular route under collective terms. This is forced by massive investment requirements and the necessity to enable economical utilisation. However, shared capacity for road freight is harder to achieve. Further, to enhance the logistics operational and environmental aspect, the introduction of new technologies plays a critical role. For example, tracking and tracing is leading towards real time information that allows continual adoption to routing and scheduling. Its efficient implementation can contribute to the avoidance of congestion, less fuel usage and higher transport utilisation, which eventually leads to less emission. Participants argued:

*Many trucks go out empty ... [and] if you put goods in them you are not adding emission. You need to balance the load and achieve higher utilisation. ... But, that is not easy for truck transport. ... [Take] the big competitors P&G and Unilever ... [I]t is much better ... if they would cooperate, but they will not. Why? [A]ssume Unilevers' ... cost per pallet is 3 Euros cheaper than of P&G. By joining, Unilever can reduce the cost by 2 Euro but P&G reduces their cost by 3 Euros. Now P&G is only 2 Euros more expensive.*

*The topic of environmentally friendly behaviour will gain importance in the logistics sector. ... Take, for example, intelligent technologies in logistics allowing real-time-information can optimize the utilisation of transport capacity. (Tr.)*

Other technological innovations for the transport sector relate to the introduction of the catalytic converter, aerodynamic designs and fuel efficient engines. Further, governmental guidelines in the last decades have additionally forced higher quality fuel and introduced specialised zones restricting the level of emission. In these zones, only transport vehicles are allowed to enter when complying with particular emission control devices, age or size and time. Beside the application of zones in major cities, a specialised zoning for the maritime sector was introduced for the Baltic and North Sea, referred as the 'Sulphur Emission Controlled Area' (SECA). The importance of these developments is evident in following comments:

*[I]mproving the environmental performance for each transport mode through technology ... is important. ... [L]ike the introduction of catalytic converter or new fuel efficient engines, ... but also higher fuel quality.*

*[T]he Baltic Sea is SECA zone. ... The vessels have to comply with particular regulations. ... That means, when you sail in the Baltic-Sea, you must either use low-sulphur heavy fuel oil or you have a sulphur-stripper installed.*

*[I]n this urban centre, we have environmental regulations issued by the authorities. ... In this context, the environmental protection zone is an important tool ... which limits the access of trucks to the city centre. (Tr.)*

Important activities to reduce land/water contamination along trade gateways and corridors are commonly linked to higher safety standards. These prevent or reduce possible hazardous spills of oil or lubricants. But, there are also environmental preservation initiatives that include regulations regarding waste, for instance the strict guidelines for waste disposal from ocean-going vessels. This topic also includes the re-usage and recycling of material. A final observation regarding land/water pollution is the implementation of cleaner technology and vehicle designs. This, for example, includes new transshipment equipment or transport vehicles such as double hull tankers. The respondents argued:

*The government has increased pressure. You have to comply with so many regulations to make sure there is no pollution or contamination. ... Then there are other requirements, for example roadworthy certificates for the trucks or those imposed by the IMO for ocean-going vessels. That certainly reduces the hazardous risks on the environment. (Tr.)*

*One of the best ways to prevent spills is the requirement of a double hull for tank vessels. That will certainly reduce the risk of a disaster for the marine ecosystem. ... [T]hen we have new regulations regarding waste disposal on the vessel. What I mean is that we cannot just throw the waste into the ocean anymore.*

To minimise unnecessary land consumption and the destruction of natural habitats, it was commented that government regulations and management plans are in place when developing logistics infrastructure. For instance, before dredging takes place it is common to undertake an investigation to understand the environmental impact, resulting in a list of recommendations. In this regard, Hamburg developed a specific dredging management plan to minimize any possible negative ecological impact. Additionally, rigorous refinements of technology are put in place when developing infrastructure, such as a special recycling plant for sea ooze and sand. This kind of planning and adoption of technology to reduce destruction of natural habitats also applies to land infrastructure developments. The participants noted:

*Sure, the deepening of the 'Elbe' river navigation channel has an impact on the environment, but we try to keep that as low as possible. Surveys by environmental experts are composed and measures to reduce negative consequences are pinpointed. ... Additionally, dredging technology is nowadays more environmentally friendly. (Tr.)*

*A management plan to dispose the sand and silt that had been dug up was developed. ... [C]ontaminated sand is cleaned in a special facility and then either stored at a depot or used in construction. (Tr.)*

It also appeared that if considerable destruction of natural habitats occurs, there will be land reservations to offset the native vegetation losses or to relocate flora and fauna. Indeed, the notion of higher land utilisation for infrastructure and facilities emerged as an important notion, not only for environmental purposes but in response to land scarcity. For instance, new efficient warehouse management designs are introduced to achieve a higher utilisation of area resulting in less land destruction. These notions are echoed in the following quotes:

*There are environmental compliance matters ... for the development of this site. This involves the reservation of a piece of land for conservation purposes. If you look at this map it shows the location of the proposed conservation reserve.*

*You can increase the productivity ... of a warehouse ... by using new technologies or adopting new designs. This can reduce the needed space per stored item. ... So we have less operational cost and on the other hand it conserves limited land resources.*

Additionally, reductions of noise and destructive visual effects have emerged in various forms. Planning provisions in Logistics City-Clusters address this by demanding anti-noise barriers and sound proof facilities. The visual appearance of massive logistics related infrastructure can be upgraded by landscaping standards that balance with the proximate environment and by using appropriate material and new design elements that create a positive effect. In the case of noise sources that relate to transport

vehicles or equipment, the development of quiet engine technology and new brake systems for trains are currently underway. Odour associated to logistics activities are commonly reduced through filters and better engine technologies. These notions are stated by the participants:

*We actually have a nice example regarding visual appearance. The shipyards are huge buildings and they do not look nice. So there was an initiative to paint them in way that they fit into the surrounding environment. Light blue, grey and green, which now looks much better.*

*[T]he train operator is introducing a specialised brake system over the next year to reduce the noise. ... [O]n some highway sections they have installed sound barriers, so the nearby residents cannot complain anymore. ... They have introduced new filters and better engine technologies to reduce the effects of odour.*

While these are reported examples of current activities to reduce environmental degradation, they might not represent all of the current initiatives in this area.

### **8.3.6 Concluding the ‘Environment’ impact category**

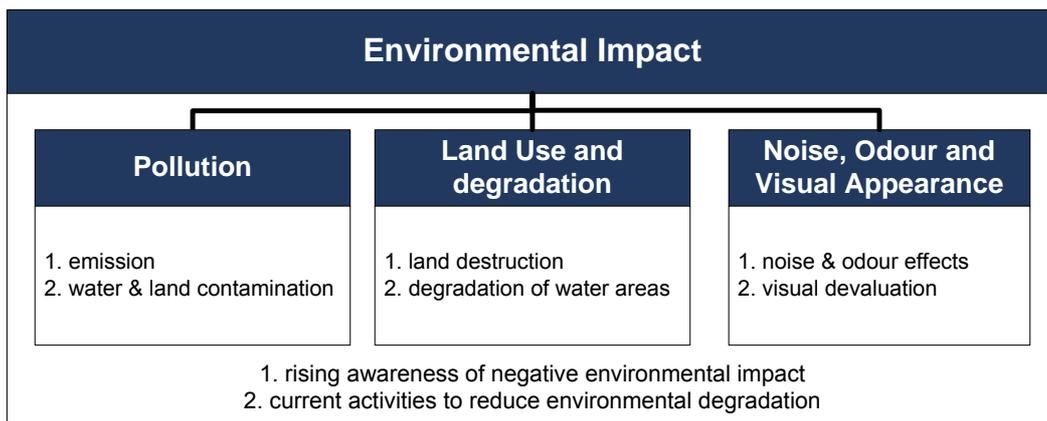
The impact on the environment is seen as negative and is segmented into three major categories (Figure 8.3-1): (i) the harmful effect of pollution and contamination of the atmosphere, water and land surface; (ii) the degradation of land areas due to its utilisation by logistics activities and water areas due to land reclamation from the sea and regularly dredging; (iii) the negative impact of related odour, noise and visual appearance.

Interestingly, despite macro (e.g. regional employment) and micro economic forces (e.g. lack of earmarked financial resources) that mitigate against the reduction of these negative effects, environmentally friendly behaviour has gained importance in Logistics City-Clusters. This is due to external (e.g. government regulations) and internal pressures (e.g. increased productivity). Indeed, the increasing awareness resulted in two interdependent approaches to reduce the negative environmental impact: (i) new logistics strategies or operational processes and (ii) environmentally-friendly technologies.

For example, multimodal transport from a macro perspective can be a suitable strategy to lower the CO<sub>2</sub> emission. Critical here is, however, the consideration of the entire supply chain, since reducing the negative impact in one part of the system might cause more harmful effects in others. But, there are also technical solutions to reduce emissions, such as real time information allowing increased transport utilisation or catalytic converter. Activities to reduce land and water contamination are commonly

related to higher safety standards and cleaner technologies. Strategies to minimise unnecessary destruction of natural habitats are, for instance, environmental impact studies before commencing infrastructure developments or the relocation of endangered habitats. Additionally, technical innovations can be implemented to enable a higher degree of land utilisation. The reductions of noise can be ensured through sound proofing of facilities or, regarding transport, through quiet engine technology. Odour reductions are mainly achieved through innovative technologies. The visual appearance of massive logistics infrastructure can be upgraded by the use of new design elements that create positive visual effects.

However, it seems that environmental friendly activities are tackled individually, rather than by an integrated Logistics City-Cluster management plan. Indeed, the aim of cluster is to increase there logistics activities and this pinpoints the necessity of a holistic eco-friendly approach by the cluster to ensure that the environmental degradation is not increasing at the same level as the logistics sector growths.



**Figure 8.3-1: The 'Environmental' impact category**

## 8.4 The social impact

Although the preliminary treatment of the social category was understood as a subjective notion with inconsistent reporting, it could not be neglected because Logistics City-Clusters are embedded in densely populated areas. The inconsistent understanding of the social dimension and its poor definitional awareness was also observed in Round II. Describing the social effects of a Logistics City-Cluster for many participants was not easy and commonly linked to the results of economic or environmental affects. Despite these difficulties, a solid understanding of the social impact could be derived and has led to an elaborated version based on three elements. First, the *liveability* factors that deal with quality of life aspects, the necessity of social

infrastructure and recreation opportunities. Second is the new category of *material wellbeing and work related impacts*. Although, this understanding was part of the preliminary well-being/quality of life category, it is now represented by its own class due to the strong emphasis in the interviews. The third category, independent from the preliminary model, deals with *interconnectedness of the community*, discussing the cultural effects on the social system.

#### **8.4.1 The effects on liveability**

The classification of 'liveability' was widely recognized in the interviews and three subtleties emerged. *The first sub-element* deals with the quality of living linking to environmental impacts. This is because effects of odour, noise and visual encumbrances from logistics activities can deteriorate the quality of life for residents in close vicinity. Indeed, possible everyday disturbance can result in adverse health effects. For instance, it can cause emotional ill-being and stress for people, made evident by sleep disorders and adverse social behaviour. But, there are also the induced physical health problems such as high blood pressure levels or hearing impairments. Participants discussed these life quality reducing effects:

*Well, nobody wants to live or open a shop in 'Billbrook'. There is nothing but concrete, highways, warehouses and a lot of railway traffic. There are not many green areas. It is certainly not pleasant to raise a family there. (Tr.)*

*Of course, there are ... discussions regarding the noise and the low quality of life. Well, these [discussions] include the topic of health risks, such as the notion of sleep disturbances, chronic stress, ... hearing loss or cardiovascular problems. No doubt, the closer you live to these activities, the lower the quality of life. (Tr.)*

Additionally, there are also health implications for the population working and living close to logistics activities due to pollution. It was noted that emissions lead to adverse health conditions, such as the difficulty of breathing, asthma or bronchitis. Also water and land contamination appeared as a threat. The same effects as for atmospheric pollution are mentioned and dermatological distress was added. Although it seems that the individual risk is not perceived as high, the consequences for a region are considerable when taking the induced expenses for the economic system into account (e.g. sick days, lower performance or medical cost). Pollution effects were reinforced by these comments:

*The worst consequence of logistics is the exhaust fumes and, as a result, particulate matter. This, in turn, is associated with respiratory problems such as asthma or bronchitis. (Tr.)*

*The pollution of water and land is also a hazard to people's health. ... Be it skin irritations or indisposition of the nervous system if you come into contact with contaminated materials. (Tr.)*

*The second notion* is the impact on the social infrastructure, leisure and recreational opportunities. It appeared that the development of the core activities and social infrastructure are intimately related. Indeed, the income generated for the government due to logistics related tax and duties will provide the means to fund social infrastructure and therefore increases its quality, quantity and accessibility. It is implicit, as discussed earlier, the more skilled the workforce is, the stronger the demand for sophisticated social infrastructure. Therefore, spending on the social infrastructure will reflect these demands and it was not surprising that all participating clusters plan and develop social infrastructure as a concerted move toward attraction of economic activities and workforce. The interviewees argued:

*After we woke the city up with logistics as an economic sector, someone figured that the number of malls and movie theatres per habitant was lower than the national average. Now huge malls and theatres are built. ... Also more recreation and commercial activities are provided. This is highly correlated to the growth of logistics.*

*Logistics ... means income for the government. ... It funds public services such as social, cultural or sport facilities and education. ... As the state authority, we know that our economic strength comes from the port and the logistics industry. That's why we invest in social infrastructure which is tailored to these workforce requirements. (Tr.)*

It was observed that the core economic activities impact on the nature of leisure and recreation opportunities. If for example the cluster is based on a major seaport, the leisure and recreational activities will take this into account by providing related attractions such as a maritime festival or sailing races. Further, the capabilities to plan and develop massive logistics infrastructure also impact on non-logistics related events and social infrastructure improvements. In one particular case these capabilities and local logistics operational skills were instrumental in hosting a world fair. Indeed, the enhancement of the social infrastructure and recreation opportunities is necessary to have a stable workforce and competitive firms, which feeds back to increased income for governments. These notions are evident in the following quotes:

*You also have to say that logistics, most of all of course the port and the sea-going vessels, are highly attractive for recreational activities. ... If I have visitors from elsewhere ... it's simply fascinating for them. The port cruises, the huge ships, sailing and all the lovely quarters along the 'Elbe' river. (Tr.)*

*When Zaragoza applied to get EXPO 2008, the committee came here to evaluate. ... They saw that the city is able to deal with big logistics projects like Plaza. ... I had to present to the committee about Plaza and our own capacity to deal with this massive project and our organising skills. ... That impressed them, so in the end we won.*

*The third sub-element* deals with the adequacy of transport infrastructure and possible risks to the people due to traffic. An overall better transport infrastructure due to Logistics City-Clusters is perceived as a benefit, since this translates into a higher degree of flexibility for travellers. This was particularly discussed by one respondent in

regards to an airport development, but is assignable to any other transport mode. However, there are perceived challenges because logistics generates high density commercial traffic that puts pressure on infrastructure capacity. Therefore, it was not surprising that congestion and unreliability of the transport network can occur. The participants argued:

*Since the airport development took place, Ryan Air located here and that increased the quality of life in the sense that people are now able to fly from here to many destinations for a better price and higher frequencies.*

*Because of the goods transport by train of this 'Freight Village' we have additionally created a high speed train connection. That is great because now everybody can reach Madrid and Barcelona so much faster.*

*The transport infrastructure is quite good here and offers a lot of flexibility for the community. ... However, the commercial transport causes congestion.*

Indeed, congestion is not only caused by transport activities, but also is linked to high population density of Logistics City-Clusters. Hence, congestion is worsening in situations where freight transport is simultaneously travelling with urban traffic. This is perceived as a challenging factor that can end in personal distress, unsocial behaviour and road rage. Further, there is also a perceived higher risk of personal safety that is induced by accidents resulting from freight transport. The tensions are hinted at in these comments:

*It is a big city with a lot of urban travellers. ... We ha[ve] good infrastructure, but the combination of people driving and trucks pushes the capacity to its limit.*

*The traffic congestion does cause stress. Sometimes you hear about so-called road hooligans in the news. The smallest thing is enough and some lose their minds and toot their horns and abuse one another without reason. (Tr.)*

*Traffic also causes an increase in accidents. Of course, you cannot just blame the trucks. They play their part, but urban passenger traffic also causes accidents. (Tr.)*

Certainly, the impact of congestion on liveability is perceived as negative, which is also destructive on the competitiveness of the cluster by creating delays and additional costs along supply chains.

#### **8.4.2 Material well-being and work related impact**

Logistics provides employment and income for the population, which has a strong relationship with the social category since it increases people's sense of well-being. It enables the satisfaction of their basic needs such as food and housing, removing psychological distress. Indeed, the logistics industry provides employment and a solid income for all educational backgrounds enabling financial stability, in particular for the workforce employed in the unskilled/semiskilled sector. In this regard it was accepted

that income from logistics increases living standards. These notions are emphasized by the respondents:

*That means many people will have a stable income that reduces their worries and provides economic independence. The people will be more relaxed knowing that they can pay their bills. ... The employment and the income relates very much to the social factor.*

*Logistics thereby fulfils a stabilizing role, since it offers employment opportunities, especially to those at the losing end of globalization. It is important that people with less education have a chance to be financially independent and are happy. (Tr.)*

Thus, employment and income provides independency for families, but also demonstrates then usefulness to society, which enhances self-confidence. It was further noted that without any employment, people would live unhealthier lives, which in return would increase negative physical health conditions. This is because the basic needs have to be covered first, and health as well as exercise is often not considered as basic needs. Additionally, it was argued that the positive affect of employment decreases anti-social behaviour (e.g. reduction of crime) and creates an integrated community, as echoed in following comments:

*The government is very happy because the development of Plaza and the creation of employment increased the confidence of the people. It is a successful project. ... [L]ogistics companies have trust and confidence to come here. This confidence reflects on the entire region.*

*When you provide income in the low skilled sector that will definitely increase their lifestyle. They will live much healthier. No subsidised housing or anything and simply a more stable life because of the financial security.*

*I suddenly thought of what a politician once said: 'Socially is something that creates jobs'. In that respect, we are doing well, since I really do believe that there is less crime once people are employed. (Tr.)*

However, there is also a cost side, which relates to the simple fact that income has to be earned. This factor acts independently and is seen as trade-off. To increase material wellbeing, working hours and responsibility generally increase, which results in decline of life-balance. Further, logistics is demanding sector for many occupations that results in irregular working hours and hard labour, especially in the transport, transshipment and warehouse sector. Although the working hours and conditions for the highly skilled workforce are perceived as being better, they are still affected. In particular, workforces such as technical inspectors for the maritime shipping sector, warehouse managers or terminal planners are expected to be available at uncommon working hours. It was argued that these unsocial and hard working conditions can affect health, social and family life negatively. For instance, evening and night shifts for employees can be stressful when having a family or if the partner works normal hours. This was commented by many respondents, such as:

*There are some areas ... that are very physically demanding, for instance the stevedoring. That is hard work, and monotonous at the same time. ... The ships' crews or the truckers are sometimes away from home for a long time. ... But, even specialized staff cannot escape the 24/7 rhythm. For example, the technical inspectors or the terminal manager have to work Sundays or at midnight. (Tr.)*

*Working long hours especially at night shifts and the hard physical work can lead to health problems, both mental and physically. ... Equally important ... [it] can lead to family stress, especially when you have to work ... night shifts or when you are not at home for days or weeks.*

As with other industries, there are both positive and negative effects. Indeed, the logistics industry provides a stable income that increases material and personal well-being, but longer working hours, shift work and hard labour have detrimental implications on the social life and pose risks to physical and psychological well-being.

### **8.4.3 Interconnectedness of the community**

Whilst interconnectedness of the community has not emerged as strongly as the previous two segments, this does not diminish its role in the framework. The category deals with three notions: (i) community belonging/identification, (ii) trust/influence of the community and (iii) international connectivity/increased cultural variety.

Regarding *the first notion* it was observed that community belonging and identification relates to the sense of fitting into the particular environment. These are important psychological aspects, since it enables self-definition, stability and well-being of the population. Due to the dominant role of logistics in the region, it is not surprising that logistics is an accepted part of the community by contributing to society. In addition to providing income to families, logistics firms meet these requirements through community investments. This notion had a wide support:

*I mean the connection of the people, the location and the logistics industry. ... We have to make sure, besides providing employment, that we create a strong community and that people can identify with the logistics sector.*

*Logistics is the core economic driver here, so it's a big part of the community. Without it, the area would look different. So logistics and the people living here have a strong relationship. ... Important is that the logistics sector is linking into the community and they do because they actually provide community investment.*

In one cluster, community investment is linked to the core gateway's 'Experience-Cluster-Initiative' that includes the provision of physical facilities, social events and services (e.g. maritime festivals, a maritime museum or seafarer house). Furthermore, logistics companies increase their identification with the community by creating so called 'Learning Centres' to support the education of young people. Beside these initiatives, there are also sponsorships for sport, art and culture. These community

investments are aimed to strengthen collective memories and shared values of the people, which consequently create a stronger community bond and identification with the logistics sector as the dominant regional economic driver. Participants stated:

*In Hamburg you have this typically 'Hanseatic' type of sponsorship. That means successful businesses give part of their earnings back to the community. ... These are mainly the shipping and the logistics companies. They sponsor social institutions and also provide strong support to the education sector. (Tr.)*

*It is especially the port has a strong influence on the social component. ... They involve the community by arranging special festivals. That way, shared values are created; the residents have fun and are happy. (Tr.)*

It also occurred that trust and influence, *the second dimension*, play an important role for this category. This notion reflects the possibilities of the community having an understanding and partial control over the effects of logistics activities. In this context, it appeared that the logistics sectors of the participating clusters transparently inform and involve the community about major developments and strategic directions. This community involvement is aimed at creating trust and to guarantee a balance when making economic considerations that impact on the environment and society. Having this caveat in mind, it is apparent that increased trust and influence will strengthen the community belonging, which reinforces individuals' well-being. Statements such as these were common:

*To create trustworthy relationships, you need to keep the community informed about future developments. ... The people who live here want to know about important regional developments. A current example is the dredging of the navigation channel and its possible positive and negative consequences. (Tr.)*

*[T]he influence of residents on important decisions regarding developments that impact the community is important. For us, this mainly means the development of the port and logistics facilities. If you involve the community, they feel more valued, which results in a higher acceptance of and identification with the developments. (Tr.)*

The *third dimension* is associated with the connectivity to international locations. It was observed that efficient logistics connectivity will increase international passenger travel and the level of international recognition. Even further, the international character of logistics leads to a more open economy. The resulting affects are that the clusters are influenced by other cultures; thus developing a wider cultural base. This impact is currently felt in two emerging Logistics City-Clusters, but was argued in all participated locations:

*Logistics is connecting the city with the world in a way it has not been before. ... It was a provincial city and now ... we are doing business all around the world because of logistics. It brings people from everywhere. It enriches the culture ... changes the face of our region ... [and] the way things work here.*

*Logistics is an international sector. Therefore, this cluster is very international. ... Netherlands in general has a very international style that is because we are a true*

*gateway country so to say. Small but always trading and having strong transport hubs and I think th[is] international influence feeds back to our communities.*

Indeed, the participants indicated that the integration of different cultures will enhance variety of life aspects and consequently increase life quality. But, it stimulates a positive feedback to logistics and trade, since an increasing multi-cultural base will strengthen bonds with international locations due to personal ties. One explicit example is the relatively small Chinese population in Hamburg that developed into a strong international business and trade bond with China. However, even with the clear messages of positive effects, there are hidden threats associated with the integration of different cultures in the existing community. As experienced by many driving metropolitan areas, the integration of different cultural backgrounds is not easy and can cause distress in a community, because of different values and beliefs. These effects are echoed by the participants:

*Different cultures can be an asset for us, because it strengthens the connectivity to international locations. This will support the trade and logistics sector. ... [F]or normal day issues it increases the quality of life. For example, it can increase the food varieties, festivals and language skills. But, there are also challenges and maybe it ends up like in many French cities.*

*That is changing the physiognomy of the entire region. ... [T]here is a love hate relationship with the immigrants. It is not always easy and there are some tensions that cause ill-being within the community. ... The fear ... is that we will repeat the errors that led to the terrible events in France last year.*

Certainly, cultural differences can lead to a reduced identification as a community, since the commonalities are less and shared memories and understanding are not developed. It appeared that this situation not only occurred in the long established clusters, but also in emerging Logistics City-Clusters, who are aware of these challenges. In both situations, the negative effect is tackled by logistics community investments that increase the identification as an integrated community, as is argued:

*We are very aware of this challenge. ... The question is how to integrate the different cultures. ... We try ... to plan in a way that mixes people from all different origins. Also the logistics sector through community investments. That hopefully will make a difference.*

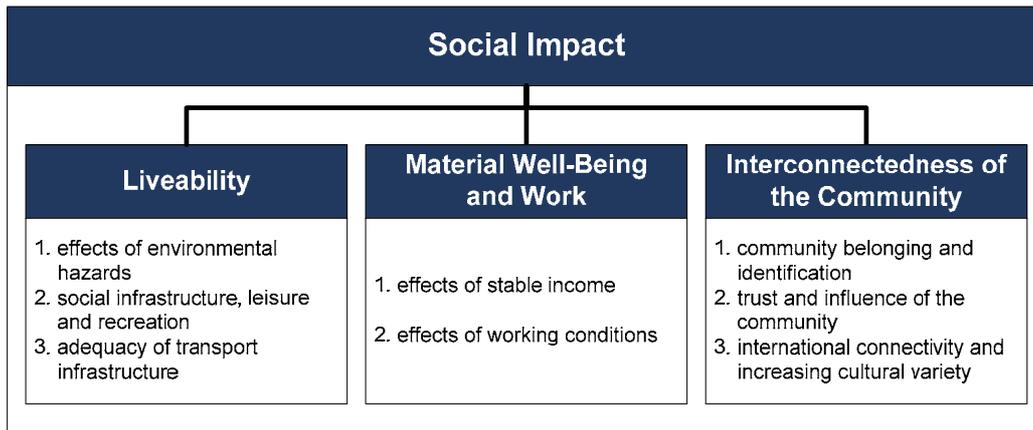
The participating clusters clearly demonstrate a reinforcing cycle of community belonging and trust, supported by the logistics industry. It appeared that the international character of logistics will increase the multi-cultural notion, which however can decrease the notion community belonging and trust. In this regard, the willingness of the logistics sector to tackle possible challenges by community investment is important.

#### **8.4.4 Concluding the ‘Social’ impact category**

Three main areas related to social impact were observed: (i) the notion of liveability; (ii) the affect of material well-being/work; (iii) the interconnectedness of the community (Figure 8.4-1). *Liveability*, the core social impact, has three elements. First, the environmental effects which can interfere with the quality of life and can result in emotional ill-being or physical health problems. However, it must be understood that the impact on quality of life depends on the degree of exposure and the type of the environmental effect, but also on the condition of the individual. Secondly, the income raised by governments can enable funding to increase the quality, quantity and accessibility of social infrastructure. Further, logistics activities can impact the leisure and recreation opportunities in a positive way. Third, transport infrastructure of Logistics City-Clusters can bring both travel flexibility for local user, but also can also reduces the liveability by causing personal distress due to structural congestion and a higher risk of traffic accidents.

*Material well-being and work* is segmented into two core notions. First, income enhances people’s financial stability and increases well-being. Indeed, it is also a proof of the usefulness in society that can contribute to the positive self image of the entire community. The second subtlety deals with the trade-off between life-balance and earning an income. Logistics is associated with irregular working hours and hard labour, which can lead to disturbed biological sleeping patterns, health problems and to family discord.

*Interconnectedness of the community* comprises three core ideas. First is the creation of community belonging and identification through the support of logistics firms (e.g. investing into social facilities or sponsoring education and sport) to increase well-being. Second, community trust in and influence on the logistics sector by acknowledging their needs, values and opinions through transparent information and involvement in logistics regional development. Third, the increase of global recognition and influence of other cultures, which enhances the variety of life aspects and strengthen the international business behaviour. However, the integration of different cultures can cause tensions in a community because of different values and beliefs.



**Figure 8.4-1: The ‘Social’ impact category**

## 8.5 Concluding the impact category

The effects on the regional economy are perceived as positive. The uninterrupted flow and handling of goods provides income and jobs, both in the blue- and white-collar sector for the local community. Also positive is the generated income for governments from the logistics sector due to taxes and duties. Importantly, these direct positive economic effects by the logistics sector further stimulate the regional economic system due to indirect and induced effects, when satisfying the demand of required goods and services within the region.

Conversely, the environmental impact of logistics activities is seen as a negative factor. In particular, the effects of pollution and contamination of the atmosphere, water and land surface are seen as core hazards. In addition, the degradation of surface and water areas due to logistics infrastructure development is harmful to the environment, since it destroys natural habitats. The last negative consequence due to logistics activities, although not as strong as the early two effects, is associated with odour, noise and visual distraction.

Together the economic and environmental impacts are factors that define the actual effects on the society. Certainly, the hazardous environmental impact adversely affects residents by decreasing their quality of live. On the other hand, the economic impact is mainly beneficial for the community, since employment opportunities create income which increases living standards and people’s sense of well-being. Further, the income for governments enables funding for social services and infrastructure. Then again there is the trade-off between life-balance and earning an income for the community, since logistics is a sector is associated with irregular working time and hard labour.

Indeed, whilst new valuable insight was found, the trade-offs between the three dimension of sustainability were strengthened. For instance, increasing constraints due to environmental policies or public demands of more urban developments can restrict logistics activities. On one hand this will create a more environmental friendly cluster with good urban social structure, but can in turn create adverse effects on economic growth in a Logistics City-Cluster by reducing its capacity to handle trade growth. The following quote is a perfect example representing this challenge:

*It is like the proverb: 'Let me have my cake and eat it too'. On the one hand people say, well, it's nice to have logistics here, it creates jobs and income. However, when the trucks drive straight past or there is congestion, people say to hell with logistics. Why do the trucks and warehouses have to be here? Or the environmental concerns associated with logistics. ... Well, in such moments people do not see the positive economic aspects of logistics. But that's just the way it is. (Tr.)*

As discussed, macro and micro economic forces can manipulate the need for sustainable behaviour. It is in this context that the economic dimension appeared to be still a dominant factor. Hence, the earlier finding that the perspective of sustainability is only an element of a desirable development path for a Logistics City-Cluster is strengthened, as is supported by following quote:

*You have to look at this in a rational manner. We are not doing it because of the social perspective to make everyone equal or in order to save the environment. If that were the case, we would create a nature sanctuary. ... Obviously we are doing it for economic reasons. We want to create jobs and we have an economic role as an international trade hub, which requires us to provide opportunities to export/import. (Tr.)*

However, it emerged that for the development of a solid cluster, the environmental and social pillars have gained importance through external and internal pressures. These forces have led to the introduction of environmentally-friendly technologies, new logistics strategies or design standards. Further, it was found that the logistics sector is also increasing its contribution to the society by making community investments and acknowledging the needs of the regional population. As a result, it creates stronger community bonds and increases life quality. This tendency towards a more sustainable development in the participating clusters is an encouraging beginning, as stated:

*Of course the logistics cluster is motivated by economic development policies. However, the other two components of sustainability are recently gaining more importance, especially the environmental aspect. (Tr.)*

The following Chapter 9 will discuss the outcomes of Round III which comprised a confirmative in-depth survey to test the Logistics City-Cluster framework. The questionnaire includes the derived statements for the 'Enabler', 'Influence' and 'Impact' categories. In particular, for each sub-class and its properties the core notions are tested by measuring the degree of 'approval' or 'disapproval'.

# Chapter 9

## Validation of the Logistics City-Cluster framework

### 9.1 Introduction: The analysing logic of Round III

This Chapter will discuss the outcomes of Round III which comprised a confirmative in-depth survey integrating an ordinal Likert-Scale to collect the perceptions of high-level stakeholders of Logistics City-Clusters on the elaborated framework. The data gathers information on a confidence dimension using the degree of 'approval' or 'disapproval' in regards to the developed categories. The numerical labelling of the confidence level will begin with 1 for 'strong approval' through to 7 for 'strongly disapprove'. To summarise the data, the 'Median' and the 'Inter Quartile Range' (IQR), the range of the middle 50% of a data set indicating the spread, are presented.

It was necessary to develop a logic to facilitate examination of the large amount of data. In this context, it was decided that if the median is *1-2 or 6-7 and has an IQR of less than 3*, the outcome shows an *acceptable result* that needs no further detailed analysis and explanation. However, if the median falls into the *range 3-5 or the IRQ is equal to or greater than 3*, the notion is regarded to be *contested*. Therefore, a further in-depth analysis is required to provide deeper insight in the areas of contestation and to identify possible elements that might explain disputed levels of agreement. To assist this finer analysis, the collected data was disaggregated in two ways. First, it was treated to see if difference was based upon sectors (industry, academic and government) or whether it was related to the geographical location of the participants (Europe and the Asia-Pacific region). This twofold segregation is of great significance due to the multi-stakeholder constructivist character of the Logistics City-Cluster and its associated interpretive theoretical perspective. There is no objective answer sought here; meanings are developed as a result of the peoples' experience and clearly this validation depends strongly on the respondents' perspective.

The following paragraphs present the survey statements derived from the elaborated Logistics City-Cluster model of Round II and discuss the outcomes of the validation based on the responses of the 33 informants. The numerical results are summarised in 'Box-and-Whisker Diagrams', where the box represents the IQR and the red coloured

square that represents the median of the responses. The degree of skewness in the data, which gives an added visual indication of the trends in the response, is thus evident<sup>13</sup>. Finally, the whiskers show minimum and maximum scores in the data set. Identified outliers, which are low frequency that are far from the central tendency, will not be discussed. Based on the sample size it was justifiable that outliers are defined as ratings that occur two or less times. The analysing logic applied in this third iteration is shown in Figure 9.1-1.

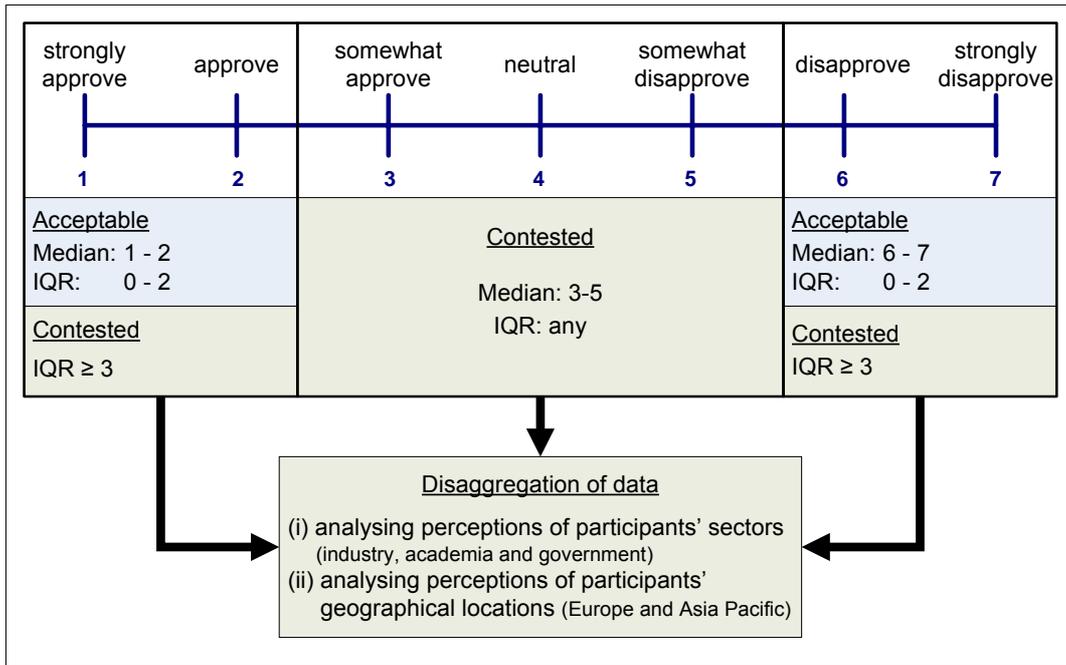


Figure 9.1-1: Analysing logic

## 9.2 Validation of the conceptual Logistics City-Cluster description

At the most general level, the notion of a Logistics City Cluster derived from Round II highlights the importance of gateways as the nucleus for international, regional and local connectivity. Additionally, it was identified that the core activities of a Logistics City-Cluster are lower and higher value-add logistics services, which consequently demand various supporting activities. It was emphasised that this economic system consists of various interrelated stakeholders having different objectives, but which share competitive positions as a cluster. Finally, the responses indicated that the task of defining a planning boundary is preferred, since fixing a clear geographical boundary

<sup>13</sup> If 50% of the data sample tends towards strongly approve taking the median as a base, the data is positively skewed. On the other hand, if 50% of the data set tends towards the direction of strongly disapprove the perception is negatively skewed.

based on economic activities is challenging. In this context, five statements (S-1 to S-5) were tested with the respondents for their approval or disapproval (Figure 9.2-1).

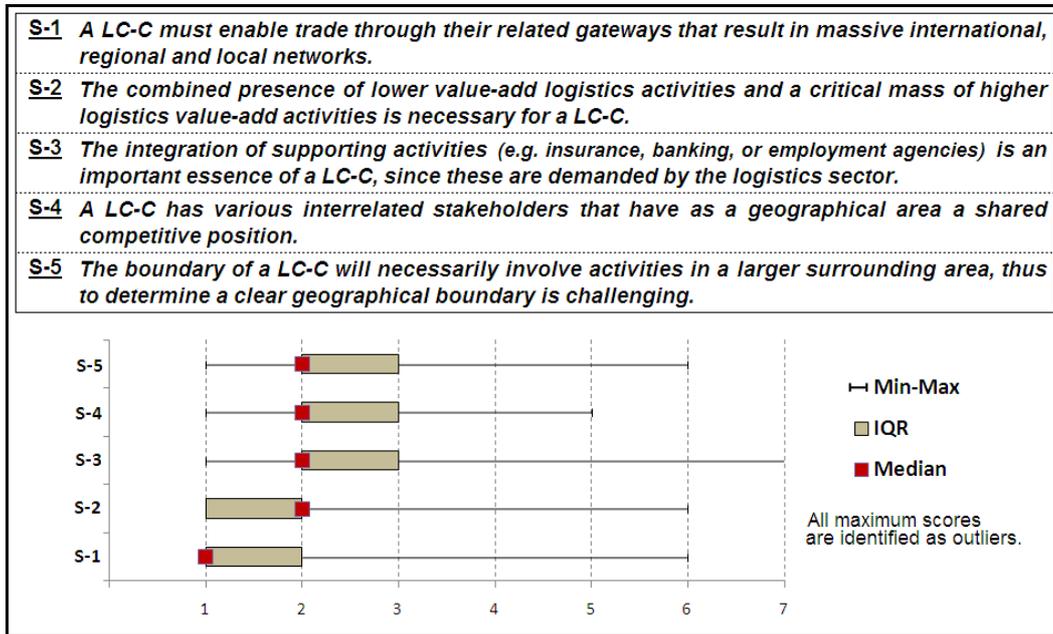
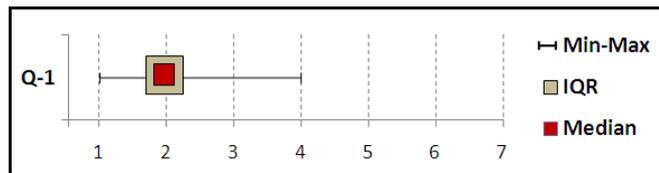


Figure 9.2-1: Results – Conceptual description

The median and IQR for the statements S-1 to S-5 are in the ‘acceptable category’ and the validation confirmed the respondents’ agreement with the interpreted definitional understanding based on Round II. This overall confirmation is especially strong for the importance of a gateway and its connectivity (S-1: strongly approved) and the core activities (S-2: positively skewed).

### 9.3 Validation of the framework

The structure of the interim framework of a Logistics City-Cluster was synthesised from the collected responses of key figures associated with world leading Logistics City-Clusters in Round II. Our interpretation of these responses suggested that the model consist of three main categories; the ‘Influence’ category, the ‘Enabling’ category and the ‘Impact’ category. The enabling category includes the core determinates and elements of a Logistics City-Cluster that provide the means to its management and development. The influence category represents the factors that have an effect on the enabling categories. The impact category integrates the positive and negative effects that occur within a region due to the existence of such a logistics-driven economic system. This understanding was presented to the participants in Round III for validation, leading to the result shown in Figure 9.3-1.

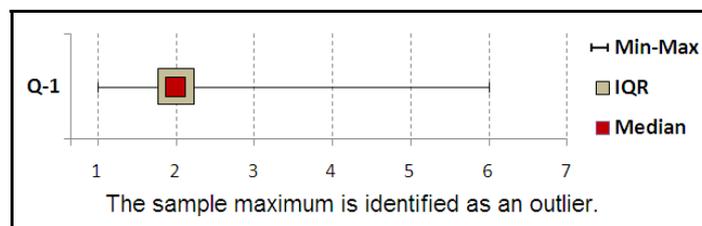


**Figure 9.3-1: Results – Structure of the Logistics City-Cluster framework**

This structure of the elaborated Logistics City-Cluster model is confirmed, having a very strong tendency towards the confidence level of ‘approve’ and with no disagreement recorded.

### 9.3.1 Validation of the enabler categories

At the more detailed level, the enabling category, the centre of the cluster model, consists of eight subcategories which are further graded into three main segments. First is the base enabler consisting of the ‘*market*’ category, which creates the demand to establish a logistics-driven system. Second, the six functional enablers (*infrastructure, service, workforce, knowledge, capital and competition*) that are the core determinates of the Logistics City-Clusters strategic design, which are informed by the particular nature of the base enabler. Finally, there is ‘*governance*’, which is the integrating enabler, aligning and co-ordinating the entire logistics system. This interim understanding derived from Round II responses was handed to the participants for their validation (Figure 9.3-2).

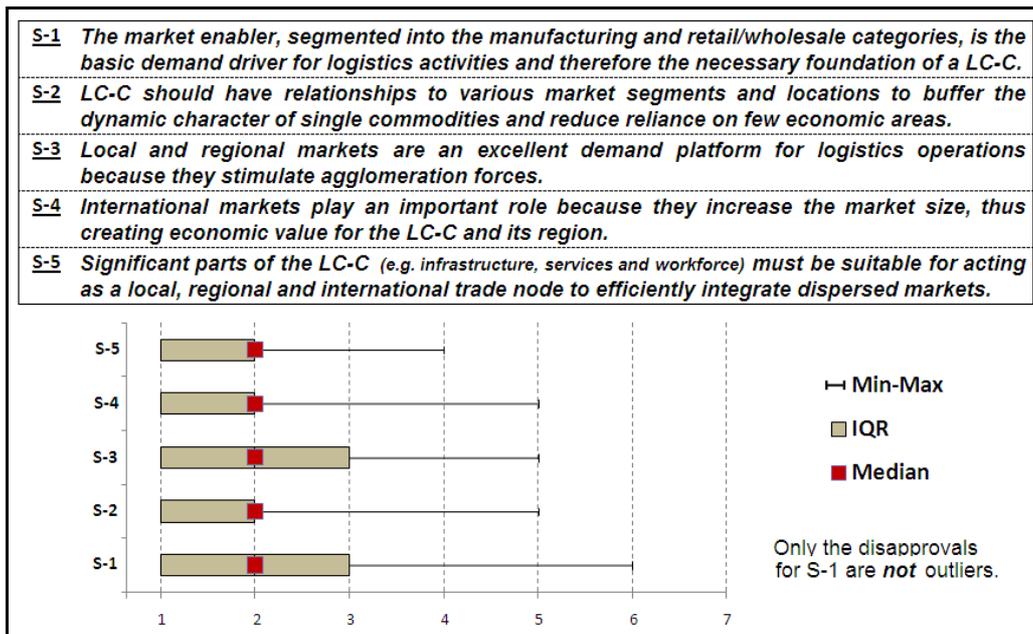


**Figure 9.3-2: Results – Structure of the enabling category**

Clearly, the results in regards to the generic structure of the enabling categories fall into the acceptable category. The use of the enabler categories are confirmed, having a strong tendency towards the confidence level of ‘approve’.

#### 9.3.1.1 The market base enabler

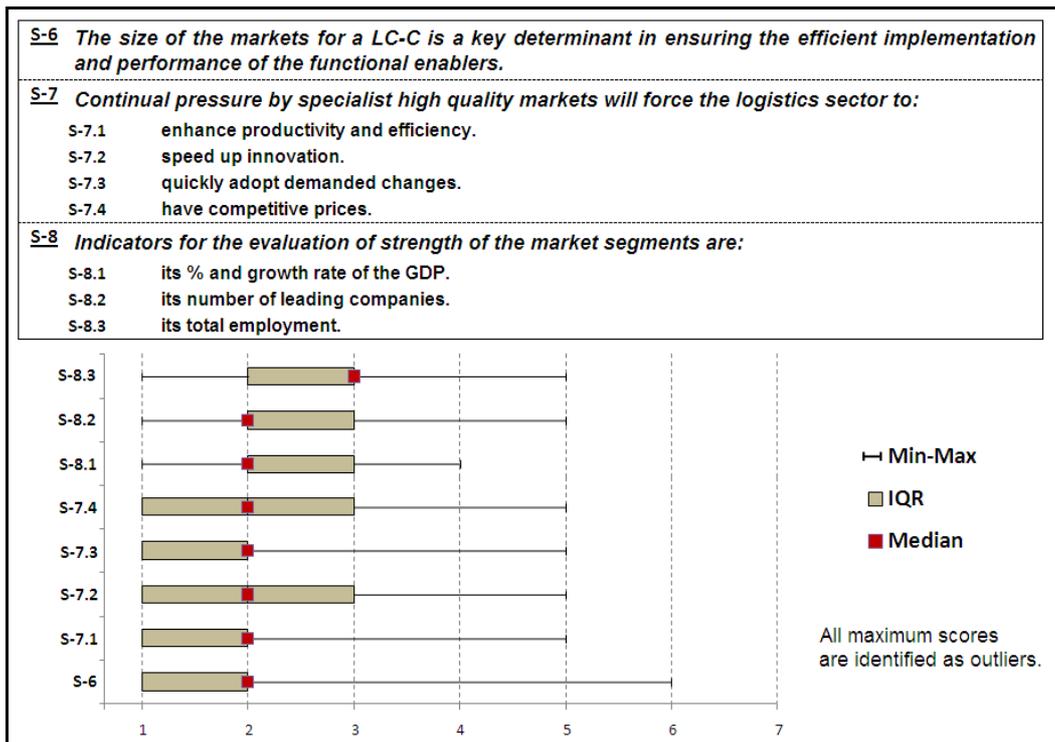
In Round II it was identified that markets are the demand base of a Logistic City-Cluster and respondents indicated that these can be divided into manufacturing and retail/wholesale sectors that connect locally, regionally and globally. The interim interpretation of Round II on market segments and location was tested by five statements (S1- to S-5) and the results are presented in Figure 9.3-3.



**Figure 9.3-3: Results – Market segmentation and location**

The results for all five statements are in the ‘acceptable’ category and confirm the earlier findings of the market segments and location. However, the disagreements for S-1 are not outliers and interestingly these were given by respondents from academia and government, who indicated that some clusters do not primarily act as retail and manufacturing origin or destination trade centres. Some are regarded as international trade consolidation/deconsolidation hubs including customizing and light assembly. Hence, it was suggested that these clusters are driven by the logistic industry not the market segments, since the logistics operators chose the hub location. Indeed, this certainly depends on the constructivist perspective. If, for example, the cluster is seen as a hub that integrates dispersed markets (e.g. international), the retail/wholesale and manufacturing sectors appear to create the demand for the logistic sector which, in turn, decide on possible consolidation/deconsolidation strategies and locations. It can be argued that this particular interpretive understanding is supported by an undisputable approval of the market segmentation, especially the logistic industry sector. Consequently, it is concluded that there are two basic market demand drivers and that the inclusion of the logistics – sector as a separate force is not essential, rather a matter of definitional perspective.

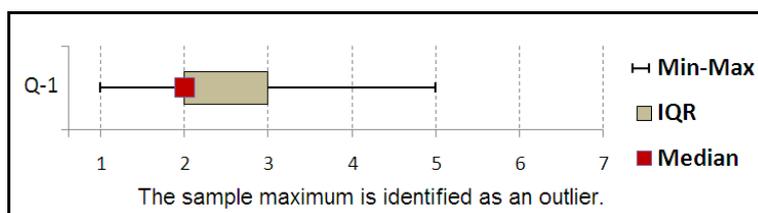
It was also observed in Round II that respondents indicated that the size and quality of markets is a key determinant for a Logistics City-Cluster. In this context three core outcomes and various subsequent conclusions were tested (S-6 to S-8) as visualised in Figure 9.3-4.



**Figure 9.3-4: Results – Market size and quality**

The respondents ‘approved’ that the size (S-6) and the quality (S-7.1 to S-7.4) of the market demand for logistics activities are of critical importance for the implementation and performance of Logistics City-Clusters. Yet, there is some suggestion that the impact of high quality market is not as strong towards quicker innovation (S-7.2) and competitive prices (S-7.4) as compared to efficiency enhancement (S-7.1) and rapid adoption to changes (S-7.3). Further, it is ‘approved’ that the percentage/growth rate of GDP (S-8.1) and the number of leading firms (S-8.3) are indicators of the market sectors’ strength. However, the total employment numbers as an indicator (S.8.4) was only ‘somewhat approved’. After critically disaggregating the data, it was found that this results from the perspective of the academic sector, whilst the other two sectors are slightly more confirmative. Although it appears that the total employment numbers are not as critical as the other three indicators, it should not be altogether omitted.

After testing the properties of the market enabler, the participants were asked to validate the understanding of this enabler. Figure 9.3-5 represents the result.



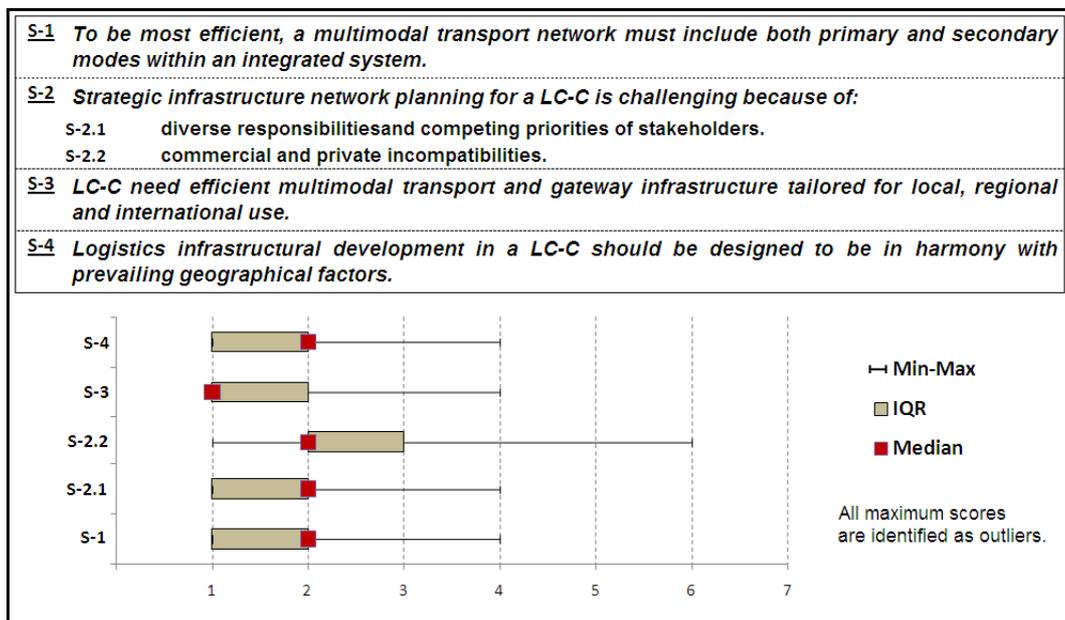
**Figure 9.3-5: Results – Market ‘Enabler’**

Clearly the generic structure and understanding of the market enabler category, including its earlier discussed properties is ‘approved’, giving further confidence in the general framework.

### 9.3.1.2 The infrastructure enabler

The infrastructure enabler, based on Round II, is structured into three elements. First is the ‘*Logistics Infrastructure*’ that takes the gateways, multimodal transport connectivity and the notion of land allocation into consideration. Second, ‘*IT-Infrastructure*’ that complements the physical flow of goods by encompassing physical ITC assets and the necessary virtual integration of all stakeholders. Third is the ‘*Social Infrastructure*’ in the form of both hard and soft elements that is provided in response to the perceived needs of a community.

**Logistics Infrastructure:** The notions of the required multimodal transport and gateway infrastructures that are divided into primary (high volume trade) and secondary levels (lower volume trade) was tested by four core statements (S-1 to S-4), shown in Figure 9.3-6.

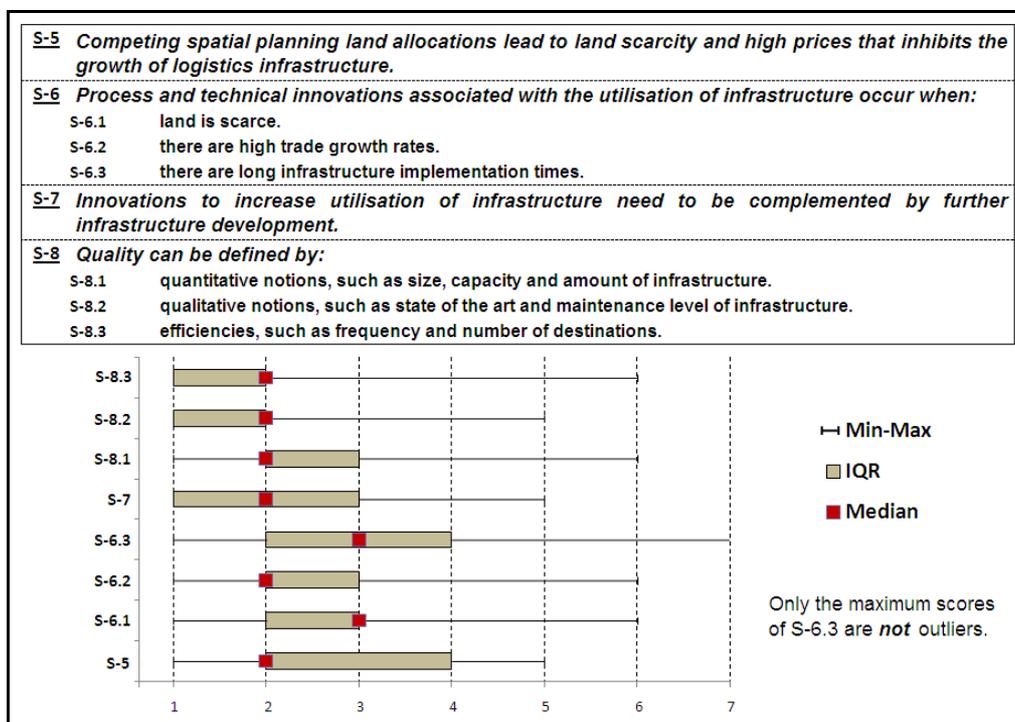


**Figure 9.3-6: Results – Transport and gateway infrastructure**

All statements relating to the transport and gateway infrastructure have an acceptable median and IQR. First of all there is a ‘strong approval’ in regards to the necessity of efficient multimodal transport and gateway infrastructure (S-3) and a positively skewed ‘approval’ in regards to the integration of primary and secondary multi-modal infrastructure as a network (S-1). Hence, the importance of integrated logistics infrastructure enabling local, regional and international trade as validated in the

conceptual description is further reinforced. It was also confirmed that there are challenges for the implementation of a network. However, it appeared that the diverse responsibilities and competing priorities of the stakeholders (S-2.1) are the dominant factors (positively skewed), since the effect of commercial and private incompatibility (S-2.2) is negatively skewed. Further, the alignment of infrastructure towards advantageous geographical factors was ‘approved’ (S-4).

The following statements S-5 to S-8 in Figure 9.3-7 relate to two other important notions of logistics infrastructure. First, there is land allocation for logistics infrastructure and its relationship of constraining factors and innovations. Second, there is the notion of logistics infrastructure quality.

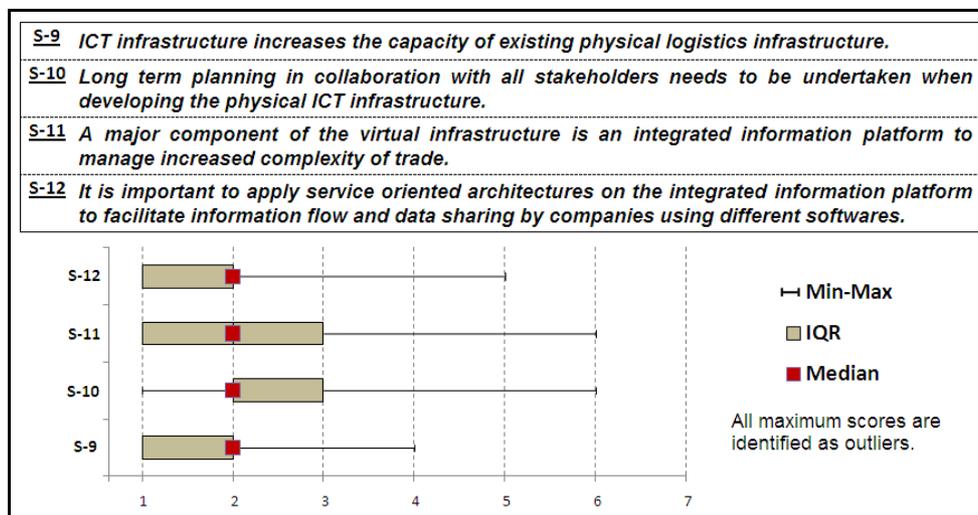


**Figure 9.3-7: Results – Land allocation, innovation and quality**

It is ‘approved’ that competing spatial planning land allocations inhibit the growth of logistics infrastructure (S-5)’. Although it is ‘approved’ that high growth rates forces infrastructure innovations (S-6.2), the other two factors, enabling innovation to increase existing infrastructure capacity, are contested. First, land scarcity as an innovation force (S-6.1) is only ‘somewhat approved’. The government and industry sectors’ median is 3 being slightly positive skewed, whereas the academics perception resulted in a median of 2.5. Further, the data disaggregation for the regions provides little evidence of major divergence (Europe: median of 3 / Asia-Pacific: median of 2.5). Hence, due to the positive skewness and especially when considering that only two participants have disapproved, land scarcity is a moderate driver for innovation to

increase existing infrastructure capacity. Second, long infrastructure implementation times as an innovation force (S-6.3) are ‘somewhat approved’. Interestingly, the industry sector ‘approves’, whereas government and academia only ‘somewhat approve’. This contradictory result may be due to the fact that the industry sector is the stakeholder using the infrastructure for commercial reasons and are forced by the market demands to somehow provide satisfactory operations. Hence, they have to address the issue of long infrastructure implementation times by innovating around it. There is also an divergence between the regions. Whereas the long implementation time in the Asia-Pacific region is approached by innovation (median 2), there is a ‘somewhat approval’ from Europe. Despite these contestations, there is confirmative consensus that innovation increasing infrastructure capacity needs to be complemented by additional physical development (S-7: median 2). Further, the understandings relating to quality determinants of logistic infrastructure are approved. There is, however, a minor tendency that the notion of quality (S-8.2) and efficiencies (S-8.3) are of more importance than the quantitative notion (S-8.1 negatively skewed).

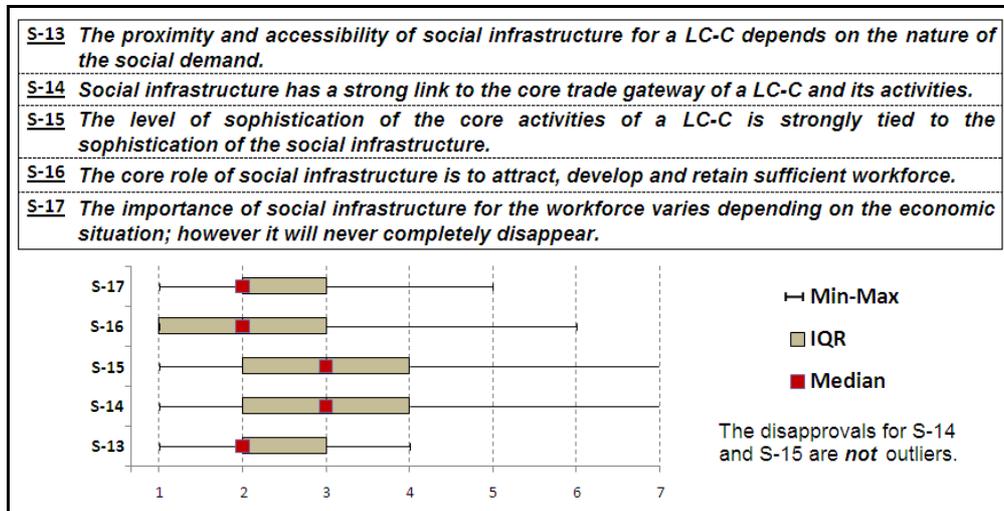
**IT infrastructure:** In Round II it was concluded that the IT infrastructure is a crucial enabler, consisting of physical elements and virtual components that facilitate seamless information flow and create business efficiencies. Four conclusions (S-9 to S-12) were presented for confirmation and the results shown in Figure 9.3-8.



**Figure 9.3-8: Results – ICT infrastructure**

The median and the IQR for S-9 to S-12 are located in the acceptable category and clearly confirm (median 2) the derived interpretations from Round II. This, especially, accounts for the increase of logistics infrastructure capacity due to ICT (S-9) and the integrated platform facilitating information flow and data sharing by companies using different software (S-12).

**Social infrastructure:** Based on the interviews the social infrastructure was concluded as a necessary enabler due to its symbiotic relationship with the economic core processes and its major role to develop and retain the workforce. Five core conclusions (S-13 to S-17) were tested as presented in Figure 9.3-9.



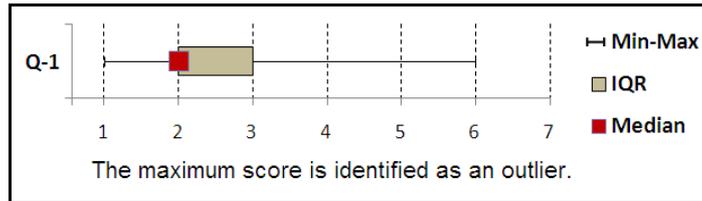
**Figure 9.3-9: Results – Social infrastructure**

The major role of the social infrastructure towards the workforce of a Logistics City-Cluster, which is influenced by the economic situation, is ‘approved’ (S-16 and S-17). Additionally, it is confirmed that accessibility of the social infrastructure depends on the nature of the social demand (S-13: median 2). However, the strong linkage of social infrastructure towards the core gateway (S-14: median 3) and the sophistication of core activities (S-15: median 3) is contested. Interestingly, there is no appreciable regional divergence for both statements. But, when examining the data regarding the sectors, different perspectives are observed. Industry ‘approved’ both S-14 and S-15 and in this context it was commented:

*[P]eoples’ choice ... to work and live ... [in] Logistics Clusters with their families depends on the social infrastructure. ... The more demanding workers and the families are the more challenging this will be.*

However, the academic and government sector only ‘somewhat approve’. Indeed, the non-confirmative perceptions for both statements are strongly driven by the government participants. Although the strong linkage of social infrastructure between the core gateway and core activities is only ‘somewhat approved’, it can be concluded that there is a reasonable relationship. This conclusion is supported by the industry sectors’ perception, which however might not be as strong as interpreted in Round II.

After testing the properties of three infrastructure elements, the participants were asked to validate the holistic understanding of the infrastructure enabler and the result is represented in Figure 9.3-10.

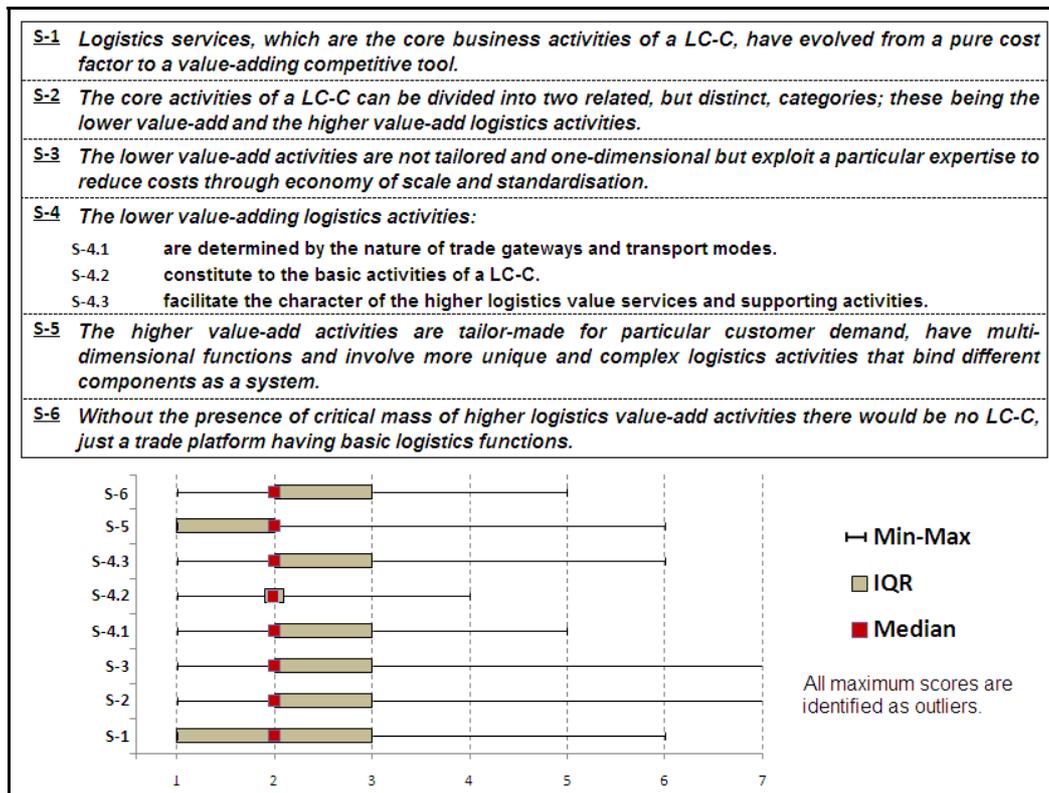


**Figure 9.3-10: Results – Infrastructure 'Enabler'**

The generic structure, including its sub-segmentation and understanding of the infrastructure enabler is confirmed, being represented by the median of 2.

### 9.3.1.3 The service enabler

The core elements of the services enabler are the logistics activities that are distinguished as lower (e.g. transshipment, transport and simple storage operations) and higher value-add (e.g. light assembly and supply chain management) levels. These services are tested by six statements (S-1 to S-6), as visualised in Figure 9.3-11.

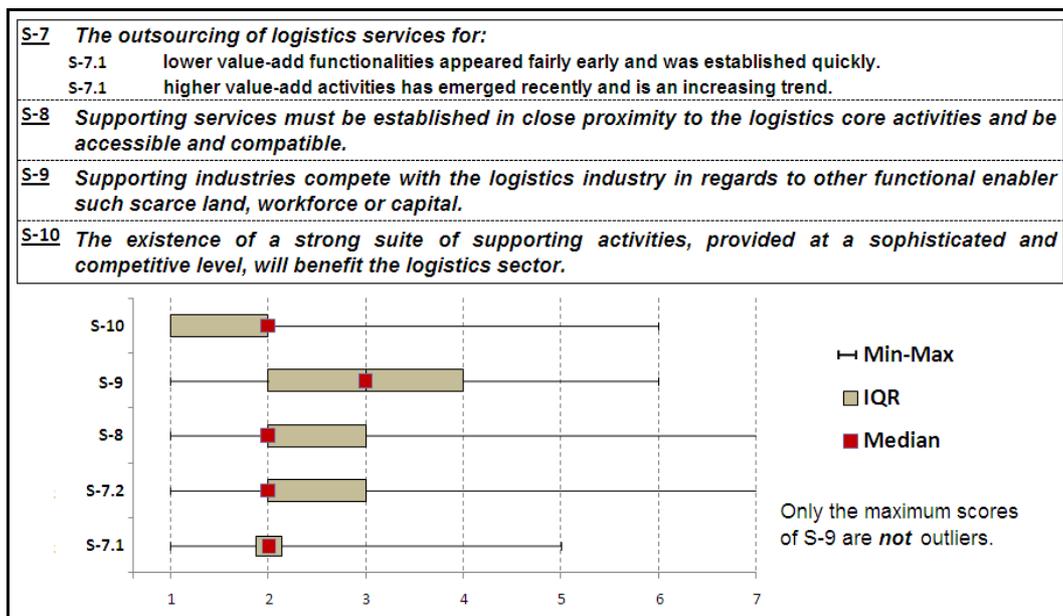


**Figure 9.3-11: Results – Logistics higher and lower value-add activities**

It is 'approved' that that the logistics activities add value (S-1) and can be distinguished between lower and higher value-add levels (S-2). The results associated with the properties of lower value-add activities (S-3, S-4.1, S-4.2 and S-4.3) are all confirmed (median 2). Hence, lower value-add services, which are one-dimensional and determined by the gateways, are the basic activities of a Logistics City-Cluster and facilitate the character of the higher logistics value-add and supporting activities. The

statements in regard to the higher value-add logistics services (S-5 and S-6) are also 'approved'. Consequently, the higher value-add activities, which are tailored and multi-dimensional, are the core determinant of a Logistics City-Cluster.

Based on Round II, it was interpreted that the outsourcing of logistics activities from the market sectors to dedicated LSP plays an important role. Further, it was concluded that this enabler integrates supporting services (e.g. banking or engineering) to appropriately assist the logistics core processes. In this context statements S-7 to S-10 were tested and the results of the confirmative process visualised in Figure 9.3-12.



**Figure 9.3-12: Results – Outsourcing and supporting activities**

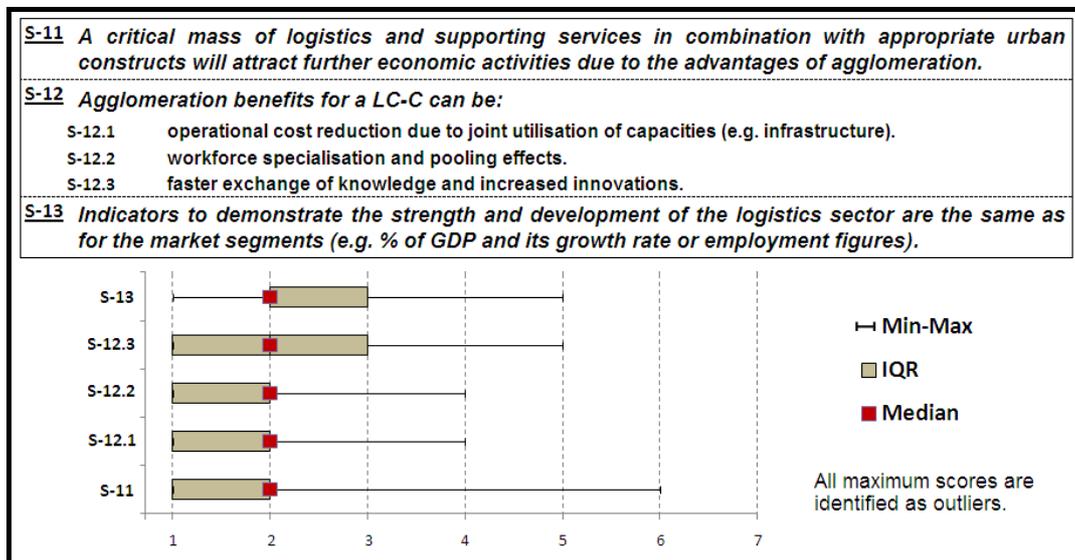
The median and IQR for S-7.1 and S-7.2 are acceptable and it is 'approved' that the outsourcing of lower value-add activities appeared early in Logistics City-Clusters, whilst the outsourcing of higher value-add services is an ongoing and increasing trend. The existence of high quality and competitive supporting activities (S-10) in close proximity of the logistics activities (S-8) is 'approved'. Despite these clear confirmations, there is some contestation related to the competition between supporting and logistics activities for other enablers (S-9: median 3). When disaggregating the data, different perceptions between the sectors and locations appeared. Whereas the competition between these activities is 'approved' in the Asia-Pacific region, there is a more neutral tendency in Europe (median 3: negatively skewed). In regard to the sectors, the government confirms the understanding established in Round II (median 2), whilst the academic sector only 'somewhat approves' being slightly negatively skewed. The industry sector on the other hand can

be seen as the neutral pole having a median of 2.5. Interestingly, various participants have commented to this notion, which can be represented by the following statement:

*I think most supportive segments have other demands for workforce or other enablers. A couple of these have no overlaps with the logistics industry, but then there are segments that have fierce competition.*

Hence, it was decided to keep this property as part of this enabler, noting that the level of competition for other enablers varies between particular activities and needs to be defined on a micro level.

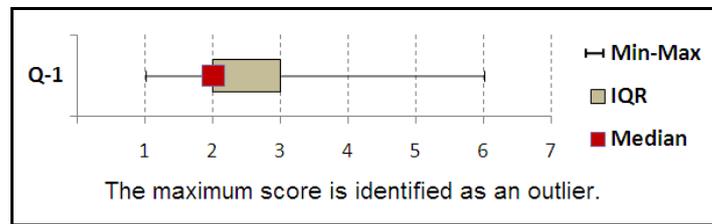
As identified in Round II the agglomeration of logistics and supporting activities will enable micro and macro benefits. It is in this regard that the importance of the core activities are tested (S-11 to S-13) and Figure 9.3-13 represents the outcomes.



**Figure 9.3-13: Results – Importance of core activities**

There is a clear confirmation regarding the attraction of further economic activities due to agglomeration forces generated by a critical mass of logistics activities (S-11: median 2). The derived benefits of such agglomeration are also all ‘approved’. However, it appeared that the benefits of operational cost reduction (S-12.1) and workforce pooling effects (S-12.2) are dominant, since these are positively skewed and no ‘disapprove’ rating appeared. On the other hand, the perceptions of the benefits of faster knowledge exchange and increased innovation (S-12.3) is equally distributed. It was also ‘approved’ that the percentage and growth rate of GDP as well as the number of leading firms and employment figures are valid indicators to analyse the economic strength (S-13), supporting the earlier findings of the market enabler.

Finally, the respondents were asked if they agree with the way in which the determinants of the service enabler have been drawn together in the framework. The outcome obtained from the analysis is shown in Figure 9.3-14.

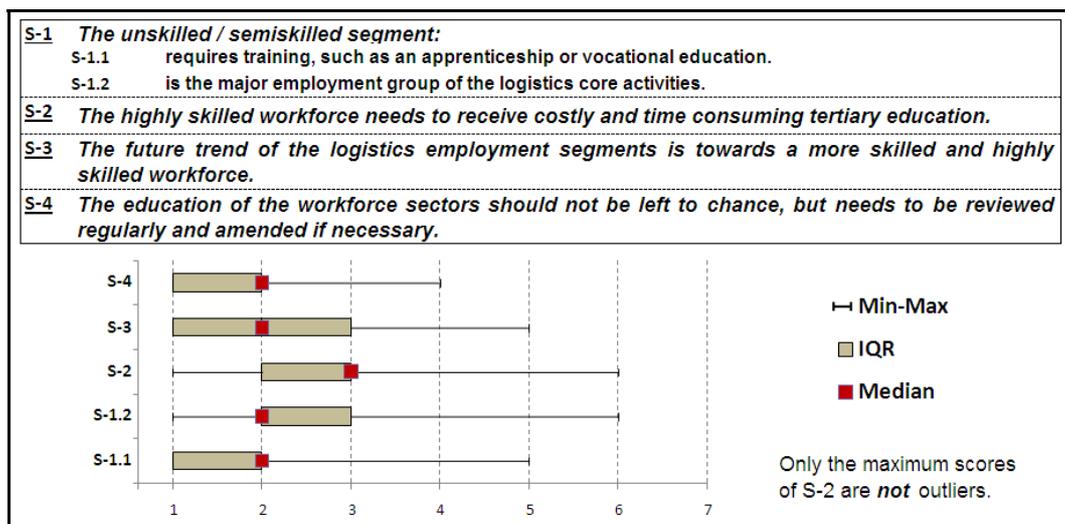


**Figure 9.3-14: Results – Service ‘Enabler’**

The median and IQR are in the ‘acceptable’ category and the structure of the service enabler category and its discussed properties is ‘approved’.

### 9.3.1.4 The workforce enabler

In Round II it was concluded that the workforce enabler is critical. In this context, four core notions on the workforce segmentation, their required education and future trends were tested (S-1 to S-4), as visualised in Figure 9.3-15.

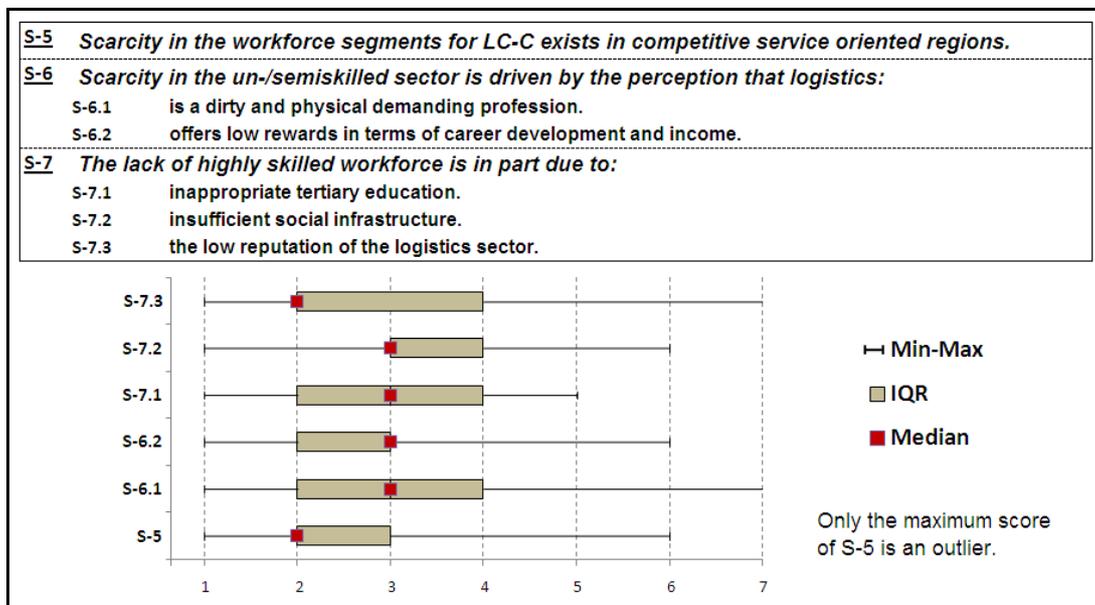


**Figure 9.3-15: Results – Segmentation of the workforce ‘Enabler’**

The median and IQR for S-1.1 and S-1.2 are in the ‘acceptable’ category and it is ‘approved’ that the un-/semiskilled segment is the major employment group and requires appropriate vocational education. There is, however, a contested perception that the highly skilled workforce requires tertiary education (S-2: median 3). The disaggregation of the data indicated no difference in the regions and only a very minor divergence in the sectors. The perspective of academia and industry present a strong cluster around the median of 2.5, whilst the government participants have a tendency towards ‘neutral’ and account for all disapprovals. This actually reflects the Round II

interpretation that the traditional un-/semiskilled functions are decreasing and more specialised workforce is required, which will not necessarily require a university degree (e.g. gantry crane operator). Consequently, this contested area is a matter of definition and which is now amended as *'a long term and costly education which not necessarily include tertiary education'*. This is further strengthened by the 'approval' of S-3. The median and the IQR for S-4 are located in the 'acceptable' category and clearly 'approve', without any disapproval, that education and training should not be left to chance, but needs to be regularly reviewed and amended.

It was observed in the second iteration that, for a Logistics City-Cluster, the attraction of appropriate workforce in competitive services-oriented regions is quite challenging and leads to labour scarcity. This understanding, linked to the different workforce levels, was tested (S-5 to S-7) and the results are visualised in Figure 9.3-16.



**Figure 9.3-16: Results – Scarcity of the workforce**

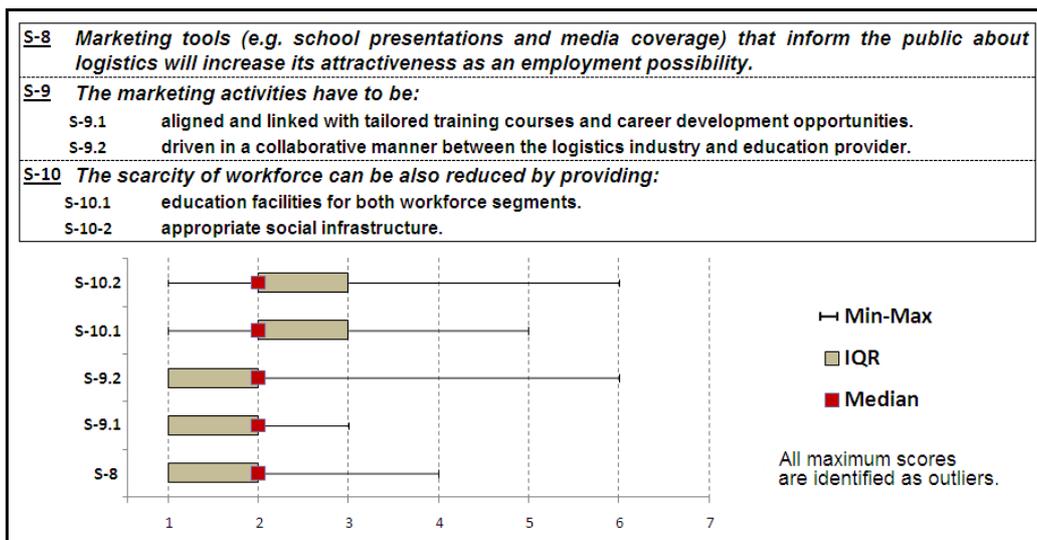
The general concern that Logistics City-Clusters co-located in thriving metropolitan areas have constant competition for all levels of labour, is 'approved' (S-5). Despite this confirmation, there is some contested understanding for the scarcity drivers of the un-/semiskilled workforce (S-6.1 and S-6.2). Regarding the sectors, a small divergence for both statements emerged. Industry and academia cluster around 'somewhat approve', whereas government has a tendency towards 'approval'. Further, there is a difference in the regions, although only on minor scale. Both regions have a median of 3, however the IQR for Europe is much greater and, more importantly, is skewed toward non-confirmative ratings. This might result from the fact that logistics has grown in Europe into a strong economic sector leading to a higher appreciation of the industry and better

career chances. Support for this interpretation is that the industrial participants account for most of the disagreements. Consequently, being a demanding profession, offering lower career and income prospects for the un-/semiskilled sector, contributes to labour scarcity only to some extent. Various participants in Round III had similar perceptions, as represented by following statement:

*For many years it has been recognised that there is a need to make the industry more attractive!*

This contested understanding also accounts for the highly skilled segment (S-7.1 and S-7.2: median 3). When disaggregating the data, a minor divergence for both statements in regards to the regions and sectors was observed. First, when examining trends in the sectors, there is a tendency towards ‘somewhat approve’ and ‘neutral’ for both the industries and government sector, having various disapproval ratings. The academics on the other hand, have no disagreement and show a stronger confirmative tendency. Secondly, this time the European perception for both statements is more affirmative (median 3), than the Asia-Pacific region (median of 3.5). Based on these results it seems that inappropriate tertiary education and insufficient social infrastructure can have a minor impact on the scarcity of highly skilled labour. However, it appeared that the core reason leading to the lack of highly skilled workforce is associated with the low reputation of the logistics sector (S-7.3: median 2).

It was found in the second iteration, that workforce scarcity commonly results in strategies to cover the labour demand. Three core conclusions and various sub-notions (S-8 to S-10) were tested, as presented in Figure 9.3-17.

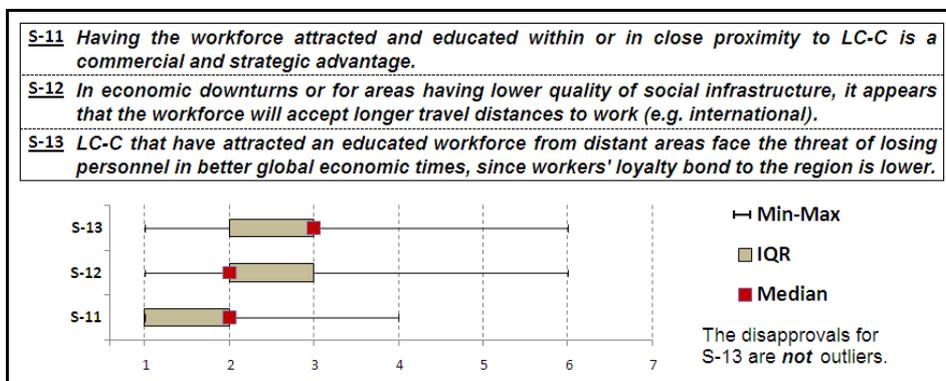


**Figure 9.3-17: Results – Addressing scarcity of the workforce**

Despite the minor contestations on the scarcity drivers, all statements addressing strategies to reduce the sources of workforce shortage are ‘approved’. First, there is

confirmation on marketing activities which inform the public about the sector to increase its attractiveness (S-8). These activities clearly need to be linked with training and career opportunities (S-9.1) and driven in collaboration with industry and education providers (S-9.2). It is also 'approved' that the provision of education facilities and appropriate social infrastructure will reduce the scarcity of labour (S-10.1 and S-10.2). Certainly, social infrastructure and education facilities are crucial for long term success. However, these are more time and resource consuming than marketing activities that can achieve results in a short time.

The final significant characteristic of this enabler is associated with the notion of workforce proximity to the particular activities. The derived core understandings, presented by S-11 to S-13, were presented for confirmation (Figure 9.3-18).



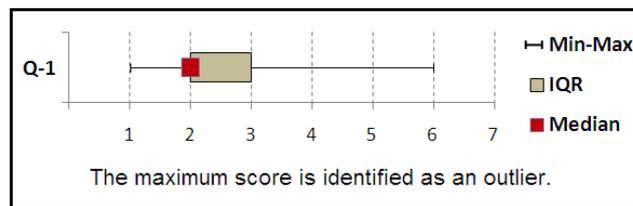
**Figure 9.3-18: Results – Proximity of the workforce**

The result for S-11 is in the acceptable category and 'approves' that it is advantageous to attract and educate the workforce in close proximity to a Logistics City-Cluster. It was also confirmed that the workforce is willing to travel longer distances or relocate for employment under special conditions (S-12: median 2). Interestingly, the earlier interpretation that educated workforce attracted from distant areas is more likely to leave in better global economic times is 'somewhat approved' (S-13). There are appreciable divergences observed for the regions and the sectors. First, both government and industry sector 'somewhat approve', whereas academia has a strong tendency towards 'approve'. However, it should be considered that the participants of the industry sector are much more closely involved in the employment of workforce and therefore their perception can be weighted stronger. Consequently, it only represents a moderate threat that needs to include various other factors as indicated in Round II. Respondents in this iteration stated:

*[This] also depends upon the unemployment level in the wider area. ... Pay [is] not included, which might be the driving determinant, not only the social views such as loyalty or social infrastructure.*

Secondly, there is a clear confirmation from the Asia-Pacific region (median 2), whereas the European participants 'somewhat approved'. Again, there is a threat of losing non-local educated workforce in both examined regions, but it seem that this challenge appears on a lower level in Europe, a factor that certainly needs to be considered when planning any logistics development.

At the end of this section the participants were ask to validate the structure and properties of the workforce enabler as an integrated category. Figure 9.3-19 shows the outcome of the confirmative test.

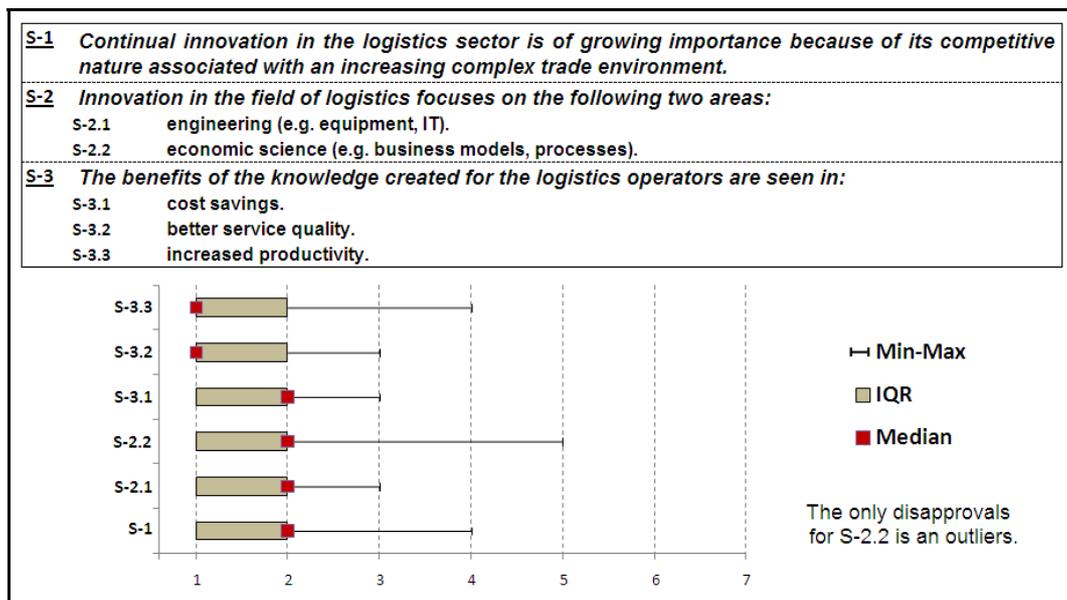


**Figure 9.3-19: Results – Workforce 'Enabler'**

The generic understanding and its more detailed properties of the workforce enabler as a holistic category is 'approved', which further strengthens the framework.

### 9.3.1.5 The knowledge enabler

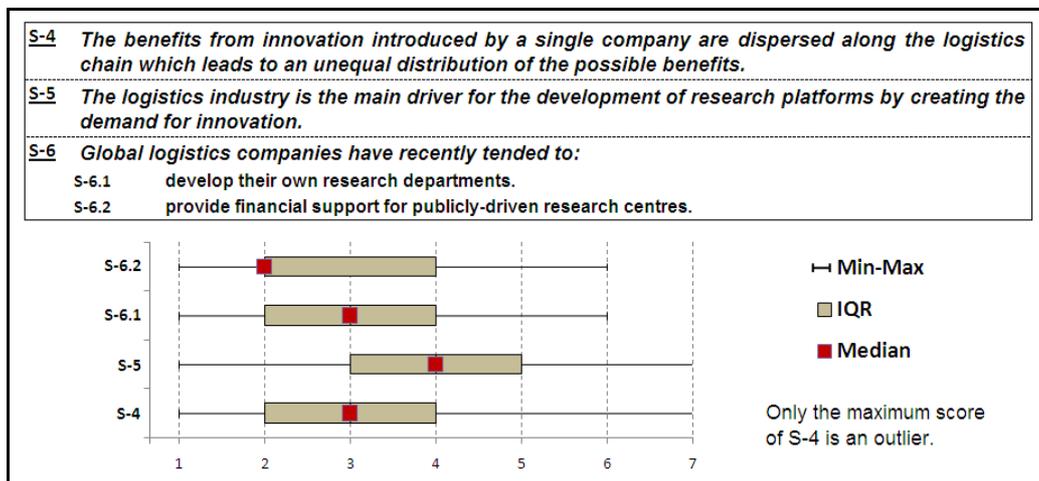
Despite the understanding that service-oriented businesses have generally lower innovation intensity, continual knowledge generation in the logistics industry is of growing importance. In this regard, three core statements and various subsequent conclusions concerning the role of knowledge creation were tested (S-1 to S-3). The statement and results are shown in Figure 9.3-20.



**Figure 9.3-20: Results – Role of knowledge creation**

All statements related to the role of knowledge creation have an acceptable median and IQR. First, it is ‘approved’ that continual innovation of the logistics sector in engineering and business/management sciences is necessary to address the increasingly complex and competitive situation that Logistics City-Clusters face (S-1 and S-2). Secondly, the three listed benefits of innovation for the logistics sector are confirmed. However, it appeared that increase of service quality (S-3.2) and productivity (S-3.3) are dominant, since both are ‘strongly approved’, whilst cost savings (S-3.1) are ‘approved’.

In Round II, it was further observed that whilst industry is an important element in the process of knowledge creation, there are some associated challenges. The interim interpretations regarding the involvement of private stakeholder in logistics innovation were tested by three major statements S-4 to S-6 (Figure 9.3-21).



**Figure 9.3-21: Results – Private role in knowledge creation**

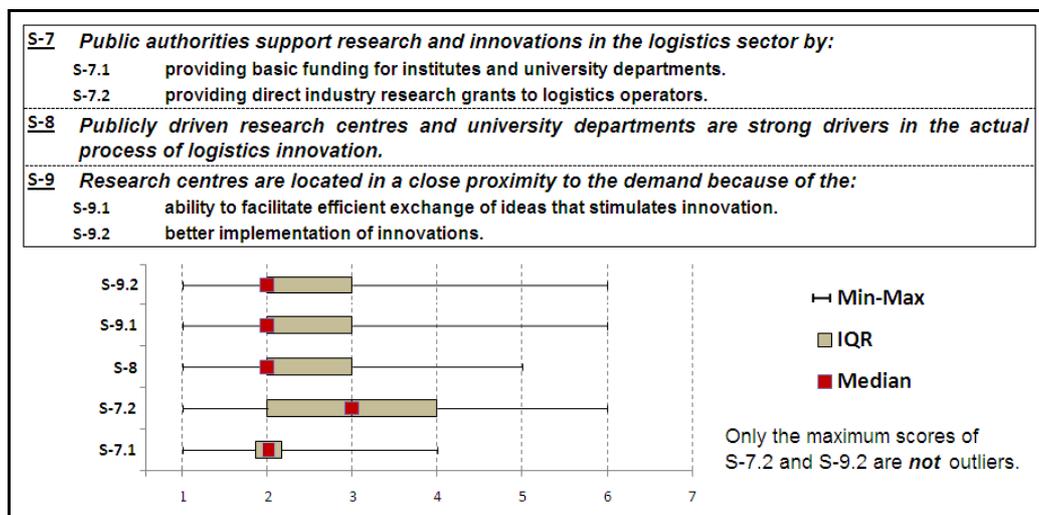
The statement that innovation introduced by a single company’s investment will disperse along the supply chain is contested (S-4: median 3). There is a divergence in the sectors’ perspectives, since academia clusters around ‘approve’, whereas government tends towards ‘neutral’ and industry ‘somewhat approves’. Further, there is a regional difference, having Asia-Pacific ‘somewhat approving’, whereas the European respondents ‘approve’. Despite this slightly contested outcome, it is concluded that innovation benefits are moderately disperse along the chain. This is based on the interconnectedness of stakeholders, the confirmative character of academia and the ‘somewhat approval’ of industry, who are closely involved in this process. Indeed, it most likely depends on the actual area of innovation and its dispersive character. Additionally, the understanding that the logistics industry is the main driver for research platforms is strongly contested (S-5: median 4). When disaggregating the data,

differences for both the regions and sectors were observed. First, there is a tendency towards ‘neutral’ for both the industry and government, whilst the academic respondents ‘somewhat approve’. Secondly, the perception of the Asia-Pacific region is more affirmative (median 3), whilst Europe’s understanding clusters around ‘neutral’. This supports the finding in Round II that knowledge generation is still contested, since logistics is not seen as innovation intense and as a sector of low skill requirements. Nevertheless, it is concluded that logistics operators are drivers for innovations, which will be discussed later in the competition enabler analysis. Important here is that other drivers were signposted:

*Shippers [market segments] and government regulation are the most important sources for logistics innovation.*

Certainly, this finding strengthens the earlier conclusions identifying market segments and the government as core innovation drivers. There is also a contested outcome when stating that logistics companies tend to develop their own research departments (S-6.1: median 3). Interestingly, it was found that there is no appreciable sectoral or regional divergence. Hence, whilst this trend is evident, it is not as strong as interpreted in Round II. Indeed, this leaves space for future development of innovative activities within the companies. Despite all these contestations, it appeared that the private sector does provide some financial support for publicly-driven logistics research centres (S-6.2: median 2).

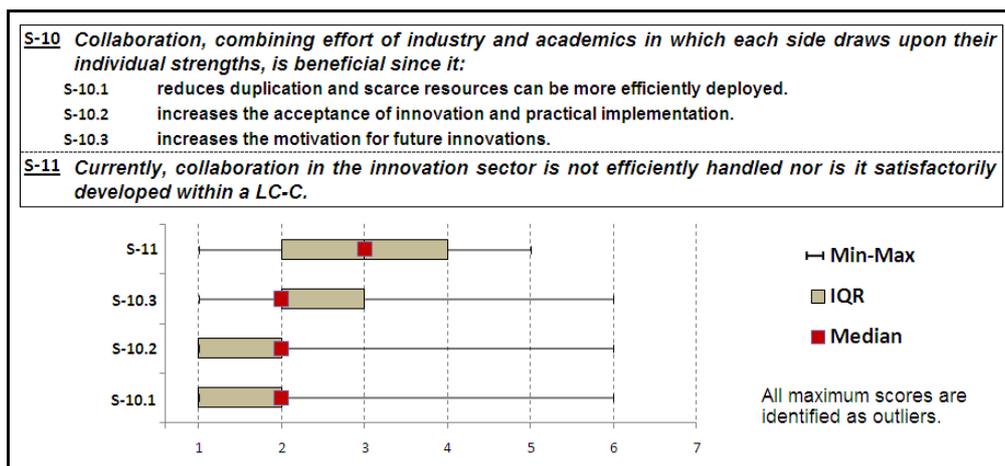
In Round II it was further derived that the public sectors’ leading role towards logistics innovation is twofold: (i) the establishment of research platforms and (ii) the encouragement of the private sector to innovate. In this context, three core ideas (S-7 to S-9) were tested (Figure 9.3-22).



**Figure 9.3-22: Results – Public role in knowledge creation**

Generally, the role of government in logistics knowledge creation is confirmed. First, it is 'approved' that the publicly-driven research platforms are strong forces in the actual process of logistics innovation (S-8) and base their existence on funding by government authorities (S-7.1). There is, however, a contested understanding regarding the provision of government research grants for industry (S-7.2: median 3). When disaggregating the data, only different perceptions between sectors appeared. The academic participants have a confirmative tendency (median 2.5), whereas the industry sector perspective is 'neutral', accounting for nearly all the disagreements. Taking into consideration that any stakeholder prefers financial support, this rating is understood. Surprisingly, the government sector, the actual grant source for the industry, only 'somewhat approves'. This might result from the lower innovation intensity and therefore small fund allocation for logistics compared to the entire research budget. Both industry and government are the core stakeholders in this notion, and therefore their perception needs to be weighted stronger. Hence, it is concluded that direct financial support for the industry sector exists on a moderate level. Close proximity of public-driven research centres to the logistics operators is confirmed. Consequently, the ability to facilitate efficient exchange of ideas and the better implementation of innovations due to proximity is 'approved' (S-9.1 and S-9.2).

It was also interpreted that the involvement of both industry and academia underpins the necessity for collaboration to facilitate benefits. In this regard two core conclusions (S-10 and S-11) were presented for confirmation (Figure 9.3-23).



**Figure 9.3-23: Results – Collaboration to innovate**

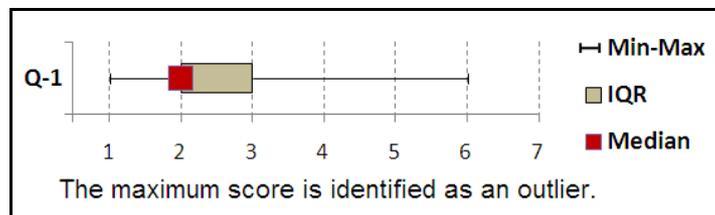
The beneficial character of collaboration between research platforms and private enterprises is confirmed. It appeared that collaboration is more efficient in reducing duplication, deploying scarce resources and increases practical implementation (S-10.1 and S-10.2: positively skewed), as compared to increasing the motivation for future

innovations (S-10.3: negatively skewed). The interpretation that the ideal situation in terms of research collaboration is not satisfactorily developed, was only 'somewhat approved' (S-11). There was a major regional divergence. Whereas the Asia-Pacific region clearly confirmed this statement (median 2), the perception in Europe was 'neutral'. There is also an appreciable difference in the sectors. The academic sector confirms the lack of collaboration (median 2), whereas the government perceives the collaboration as quite sufficient (median 4). The industry sector on the other hand 'somewhat approves'. It is in this context that one participant in Round III stated:

*I think that academia should [maintain] some distance [from] the industry to be able to play its function.*

Certainly, there is a warning observed from the European perspective that the academic sector needs to preserve their objective role that is not driven by business performance factors. Hence, it can be concluded that the collaboration in Europe, according to their beliefs and culture, is appropriate, whereas in the Asia-Pacific region there is potential to utilise the benefits of closer working relationships between academics and the logistics operators.

After assessing the properties, the integrated nature of the knowledge enabler was tested and the outcome of the validation is visualised in Figure 9.3-24.

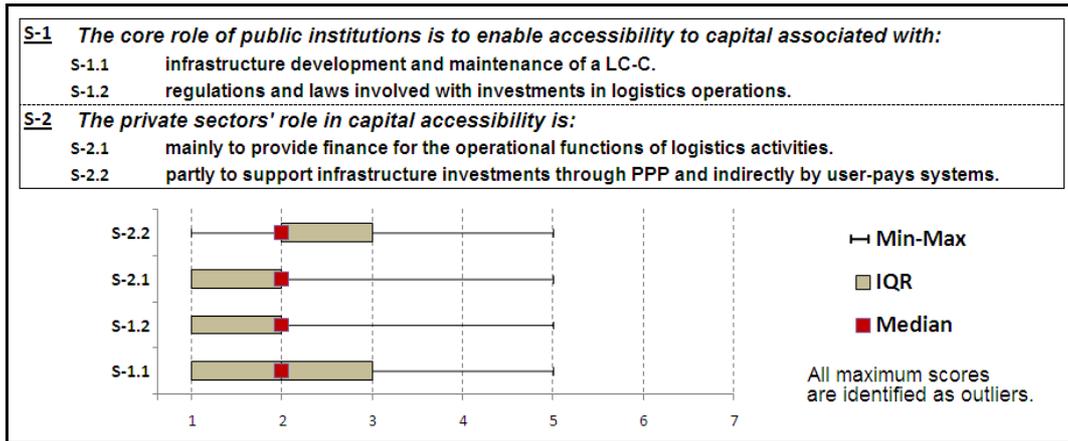


**Figure 9.3-24: Results – Knowledge 'Enabler'**

The generic structure and understanding of the knowledge enabler is confirmed (median 2 and IQR 1). This approval provides further confidence to the model, however the minor amendments in regards to contested notion of the private sectors' involvement in knowledge creation needs to be considered.

### 9.3.1.6 The capital enabler

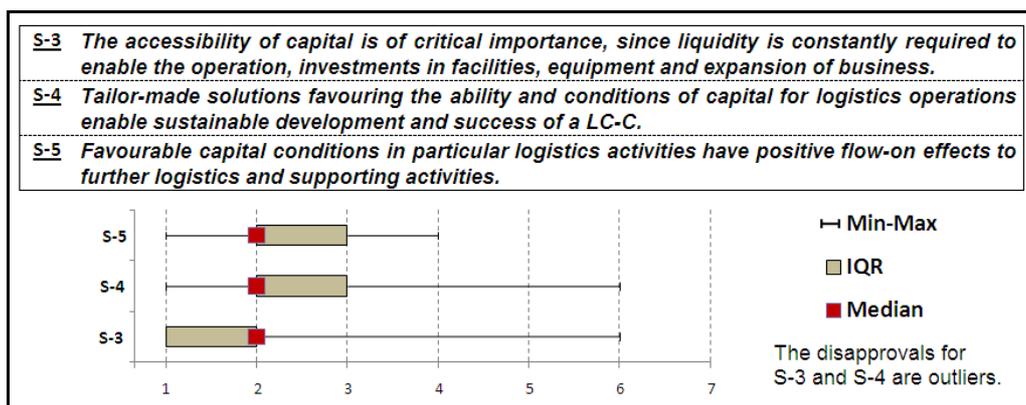
Based on the interviews, this enabler was differentiated into public and private capital sources, both having their specific role towards financial accessibility in a Logistics City-Cluster. The derived understandings of the private and public role towards capital accessibility were assessed by statements S-1 and S-2 (Figure 9.3-25).



**Figure 9.3-25: Results – Private and public role in accessibility of capital**

The results for all statements are in the ‘acceptable’ category. Hence, the importance of capital investment by governments for the development and maintenance of infrastructure is critical (S-1.1), notwithstanding that there is also a growing private involvement in infrastructure financing (S-2.2). Additionally, it is ‘approved’ that the capital needed to finance the operational and strategic functions of the activities is mainly associated with private institutions (S.2-1), but can be influenced by public regulations and laws (S-1.2). Consequently, the conjecture of derived segmentation of this enabler into public and private subcategories is affirmed.

In Round II it was concluded that the accessibility of capital, through favourably tailored conditions, is an important factor for logistics operations. The notion of capital accessibility by the public and private sectors for logistics companies was presented (S-3 to S-5), leading to the results visualised in Figure 9.3-26.

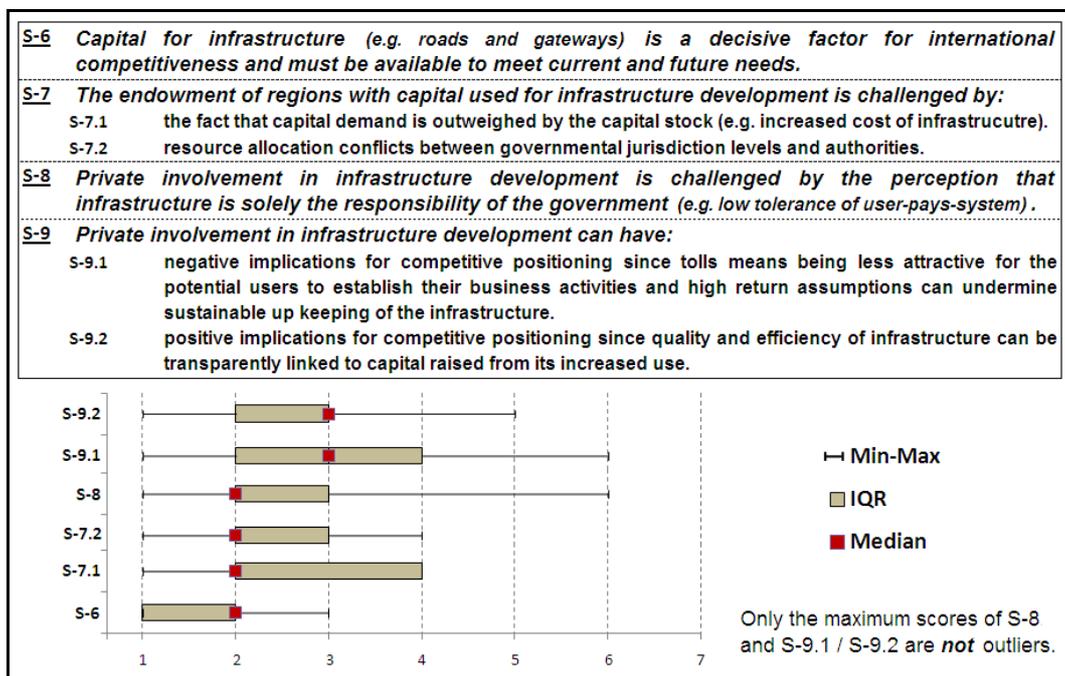


**Figure 9.3-26: Results – Accessibility of capital for logistics operations**

The respondents ‘approved’ the critical importance of accessible capital for the logistics sector to enable the necessary investments for current and future operations (S-3). In this regard, the beneficial character of available and reliable tailored capital conditions for the logistics sector is confirmed (S-4: median 2), resulting in a greater opportunity

for Logistics City-Clusters to succeed. It was further 'approved' that favourable capital conditions for particular logistics activities have positive flow-on effects to associated activities (S-5). Hence, favourable conditions at the micro-level for particular core activities can have wider macro benefits.

In the second iteration, it was also concluded that the endowment of capital for infrastructure development is beneficial to meet current and future demands. It appeared that the provision of investment capital involves mainly public governments, but also private stakeholders. Consequently, four statements regarding infrastructure investment by both sectors were tested (S-6 to S-9), as represented in Figure 9.3-27.



**Figure 9.3-27: Results – Accessibility of capital for infrastructure investments**

It is clearly 'approved' that having sufficient access to capital is a competitive advantage, since efficient infrastructure, a vital element of any Logistics City-Cluster, can be provided (S-6). Despite the desirable endowment of capital, it is confirmed that the unbalanced capital demand and supply of authorities (S.7.1: median 2) challenges infrastructure development. Further, the resulting allocation conflicts between different authorities are 'approved' (S-7.2). This challenge of capital allocation led to the participation of the private sector in infrastructure developments. In this regard, it was 'approved' that the private involvement is challenged by the public perception that infrastructure development is solely the responsibility of government (S-8). Interestingly, it also appeared that there are other challenges as represented by following statement:

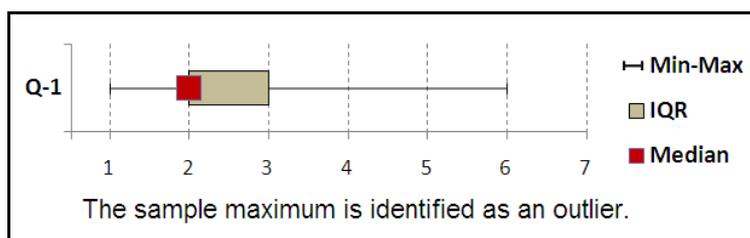
*Private investors will tend to invest only into the most profitable links and nodes, However, this would not work without the public paying for the other elements of the network that are not providing two digit profit margins.*

Certainly, industry focuses on investment which promises an acceptable return of investment, which is however not always achievable for all required infrastructure elements. Hence, investing only in profitable parts will not lead to a sustainable Logistics City-Cluster, since a structured network is essential. Despite these challenges, the negative implications of private involvement are only 'somewhat approved' (S-9.1). When disaggregating the data, only divergences for the sectors were observed. Surprisingly, the government is behind this contested understanding (median 4), whilst the industry 'approves' possible negative effects. Academia is the neutral pole clustering around the median of 3. Additionally, the positive implications of the private involvement are contested (S-9.2), having only a sectoral difference. However, this time it is the government sector confirming (median 2) and the industry 'somewhat approving', whilst academia again has a balanced stance (median 2.5). The difference between the industry sector and government for both implications is consistent. It might be explained by the fact that the public sector favours financial support and would not focus on negative social or political implications, rather the positive effects to ease the pressure on their constrained budgets. Industry clearly reflects on the benefits and threats differently before committing resources. Hence, industry has a more critical focus on possible negative implications and a conservative perspective towards the benefits. It was stated in Round III:

*[R]eflect recent developments of Railtrack UK, the New Zealand rail infrastructure and also the lessons learned from Australian investment companies e.g. Babcock & Brown and Macquaire. Did their involvement really lead to more efficient infrastructure, to shorter planning times, to sustainable infrastructure maintenance? No.*

It is concluded that the discussed negative and positive implication are valid. However, it needs to be considered that the involved stakeholders, here government and industry, strongly focus on their individual benefits.

Finally the respondents in Round III were asked to either approve or disapprove the understanding of this enabler. The result is visualised in Figure 9.3-28.



**Figure 9.3-28: Results – Capital 'Enabler'**

The result or the generic structure of the capital enabler falls into the ‘acceptable’ category (median 2). The results strengthen the earlier discussions and additionally enrich the prior findings in regards to the impact induced by private investment in infrastructure.

### 9.3.1.7 The competition enabler

It appeared that intra- (within a cluster) and inter- (between clusters) competition, are an important element in the development of Logistics City-Clusters. Additionally, it was found that competition regarding gateway activities and other logistics services need to be considered separately. In this context two core conclusions are tested (S-1 to S-2) and the results shown in Figure 9.3-29.

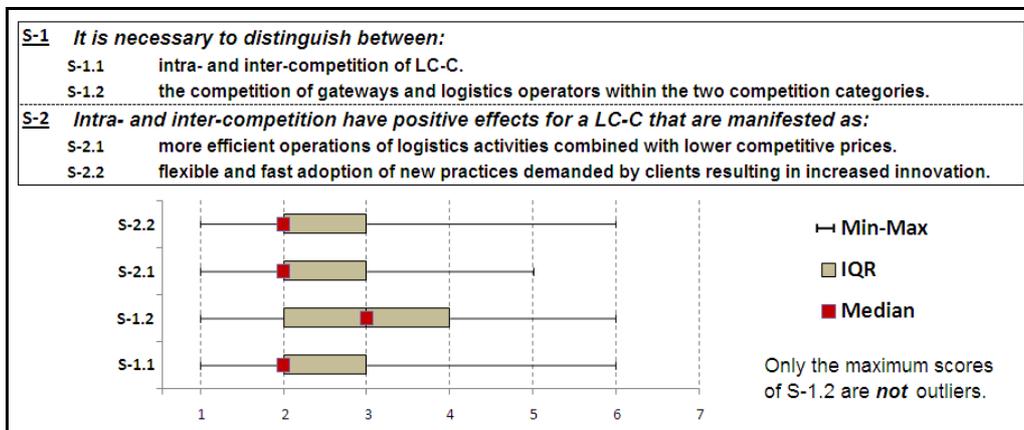
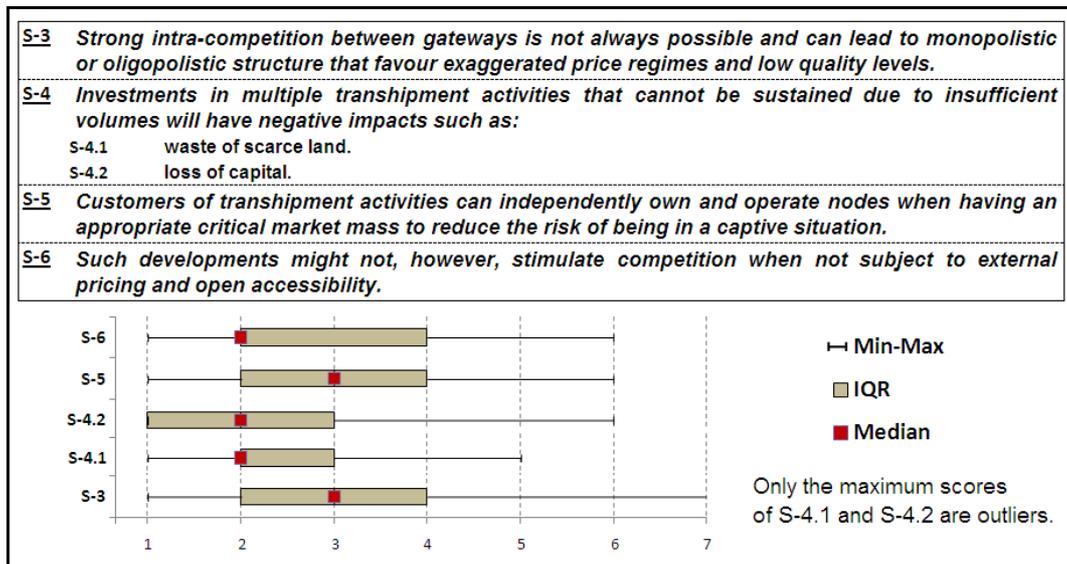


Figure 9.3-29: Results – Classification of the competition ‘Enabler’

The segmentation of this enabler into intra- and the inter-competition (S-1.1) is ‘approved’. However, the additional differentiation between logistics operators and gateways is contested (S-1.2: median 3). While there is no appreciable regional divergence, there is for the sectors. The government ‘approves’, whereas the academic sector clusters around the median of 3 accounting for the only four non-confirmative perceptions. The industry participant’s perception is located between these two (median 2.5). Although this sub-segmentation is slightly contested, its integration in this category is essential. This is supported by the tendencies of the government and industry sector and the later ‘approved’ sub-notions for both sub-segments. The derived benefits of inter- and intra-competition are ‘approved’ (S-2.1 and S-2.2). Hence, competition in the logistics sector is agreed to enhance operations, force lower prices and hasten adoption of demanded practices, which motivates innovation.

In Round II it was concluded that strong gateway intra-competition is not always economically sustainable and therefore oligopolistic or monopolistic gateway structures

can appear. The following four core conclusions S-3 to S-6 on intra gateway competition were assessed (Figure 9.3-30).



**Figure 9.3-30: Results – Intra-competition of trade gateways**

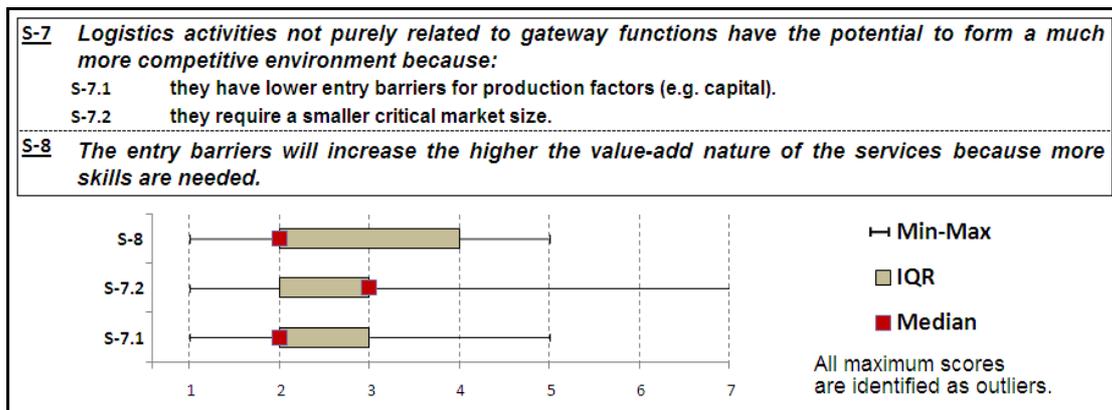
The general concern that the lack of intra-gateway competition can lead to exaggerated price regimes and low quality levels (S-3) is ‘somewhat approved’. The regional results are similar, but there are clear divergences within the sectors. The government sector has a ‘neutral’ perception, whereas the other two sectors are more affirmative. Industry ‘approves’ and the academic sector’s perception is represented by a median of 2.5. The government contestation might results from the fact that gateways are commonly associated with public authorities, and approving low quality or exaggerated prices in is not likely. However, the academic respondents do not strongly confirm these conclusions. Consequently, these results may be explained by strong inter-gateway competition all observed clusters face. Hence, it is concluded that low intra-gateway competition has a negative effect on prices and quality, especially when the inter-gateway competition is not strong. In this regard it was commented:

*Depending on the situation it does not need to be negative having only one terminal operator, even state owned. ... Important is always the broader context like competition with other gateways in the regions.*

It is understood that investments in multiple transshipment activities cannot be sustained if insufficient volumes exist, and it is in this context that the negative effect of wasting scarce land (S-4.1) and losing capital (S-4.2) are ‘approved’. Further, the observation that major customers of the transshipment activities own trade nodes is contested (S-5: median 3). There are, however, no appreciable sectoral or regional divergences. Hence, despite this minor contestation, it is concluded that on some occasions a large corporation might operate and own gateways to reduce negative effects of oligopolistic

or monopolistic structures. As discussed in Round II, these players then need an appropriate critical market mass to justify these large infrastructure investments. In this circumstance it was ‘approved’ that single organisation-driven development might not stimulate competition (S-6). Hence, open accessibility and external pricing are crucial.

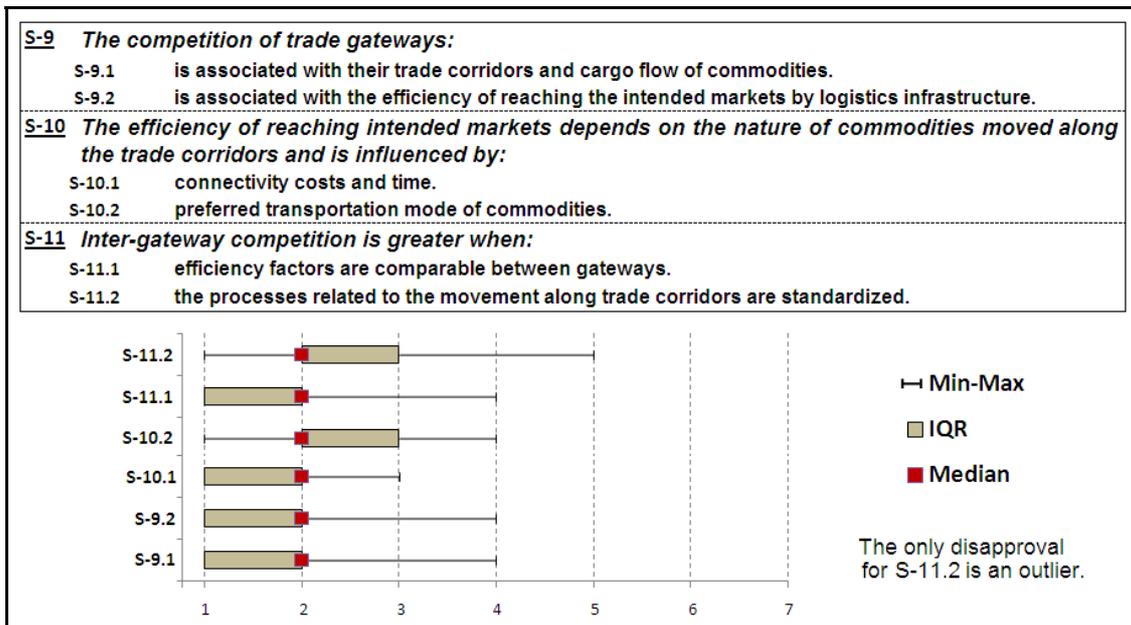
Based on the interviews it was also concluded that intra-competition of a logistics service provider is favoured due lower entry barriers, which enables benefits for the entire cluster. This interim understanding, stated by S-7 to S-8, was presented for confirmation, as presented in Figure 9.3-31.



**Figure 9.3-31: Results – Intra-competition of logistics service provider**

It is ‘approved’ that lower entry barriers related to production factors for logistics operators allow competition (S-7.1). Interestingly, the justification for a higher level of rivalry based on the need of a smaller market size is contested (S-7.2: median 3). There is only a minor sectoral divergence observed. Whereas the industry sector ‘approves’, the government and academic respondents’ perception tends towards ‘somewhat approve’. The clear confirmation of the industry participant, the sector that is closely involved with the notion of rivalry, led to the conclusion that both low entry barriers and smaller critical market sizes are the foundation for a competitive environment. Also, the interdependency between a required smaller market size and some lower entry barriers support this conclusion. The result for S-8 shows ‘approval’. Hence, entry barriers will increase with the enhancing nature of services.

In Round II it was found that inter-gateway competition is associated with trade corridors and their infrastructure efficiency to reach the intended markets. In this context, three core statement and various sub-conclusions (S-9 to S-11) were tested and resulted in the outcomes seen in Figure 9.3-32.



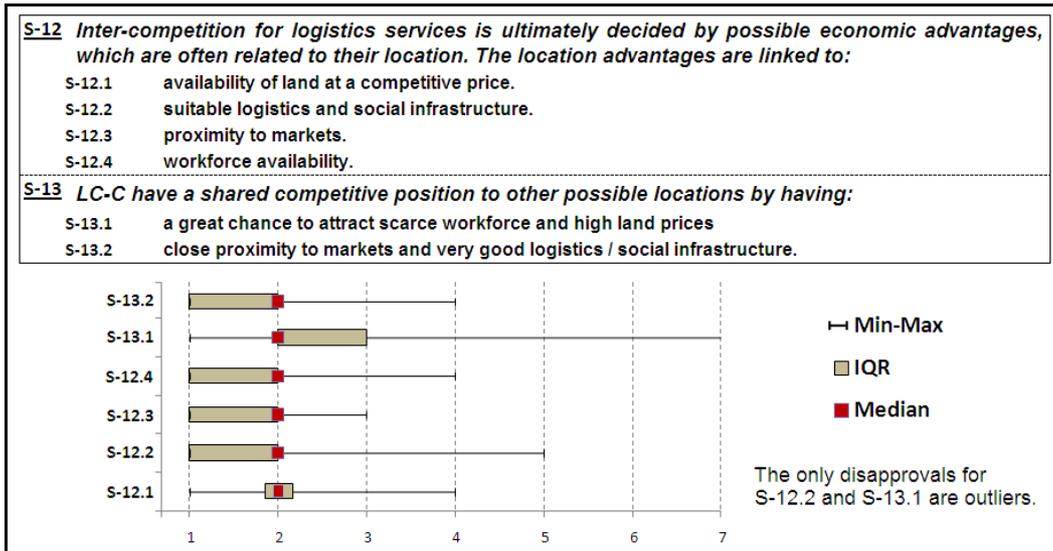
**Figure 9.3-32: Results – Inter-competition of trade gateways**

The major role of the trade corridors and the efficiency of reaching the markets by logistics infrastructure for the inter-gateway competition (S-9.1 and S-9.2) are ‘approved’ by the respondents. This is also illustrated by one participants’ comment:

*Location and connectivity are major factors! ... [P]orts benefits are also derived by the hinterland connectivity.*

The importances of influential factors that define the efficiency of connectivity to markets are also confirmed. There is, however, a minor view that the notion of connectivity cost and time (S-10.1) are more important than the preferred transportation mode (S-10.2: negatively skewed). Furthermore, both statements relating to the possible increase of competitive behaviour are ‘approved’. There is a suggestion that comparable efficiency factors might have a stronger effect on competition (S-11.1: positively skewed) than standardised cargo flow processes (S-11.2: negatively skewed).

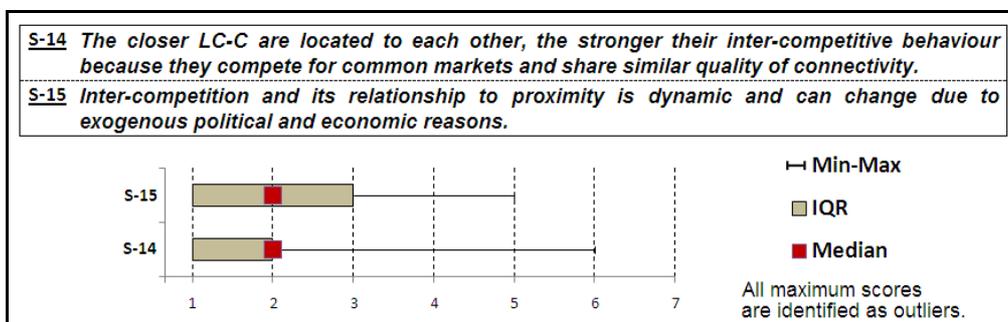
There was strong evidence in the second iteration that the decisive factor for inter-competition of logistics operators is the location-associated economic and social advantages. Consequently, two core ideas and subsequent notions (S-12 and S-13) were presented for validation, as visualised in Figure 9.3-33.



**Figure 9.3-33: Results – Inter-competition of logistics service provider**

All statements regarding possible economic advantages of are approved. However, it seems that suitable infrastructure (S-12.2), proximity to markets (S-12.3) and workforce availability (S-12.4) are slightly more important, than the effect of cheaper land (S-12.1). This might be explained by the fact that not all logistics operators need massive land investments to ensure their operation. Further, the derived shared competitive positions of Logistics City-Clusters towards other locations are ‘approved’. It appeared that good infrastructure and the positive effect of market proximity (S-13.2) is the dominant shared position, since the possible greater chance to attract appropriate workforce and high land prices (S-13.1) is negatively skewed.

The final significant characteristic of this enabler is associated with the interdependency of proximity and inter-competition. Two conclusions were tested (S-14 and S-15) and Figure 9.3-34 shows the outcome.

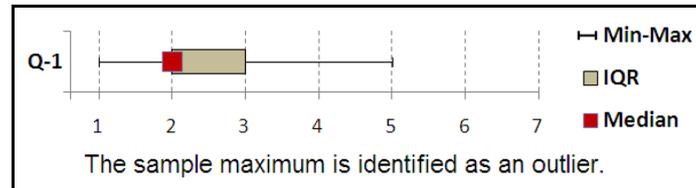


**Figure 9.3-34: Results – Interdependency of proximity and inter-competition**

The median and IQR for both statements are acceptable. It is clearly ‘approved’ that close proximity of the clusters to each other increases their rivalry, based on the

reasons detailed in Round II (S-14). Also the dynamic relationship of proximity and competition based on changes in the location advantages factors is 'approved' (S-15).

After testing the properties, the participants were asked if they agree with the way in which the determinants of the competition enabler have been drawn together. Figure 9.3-35 provides the results obtained from the analysis of the data.

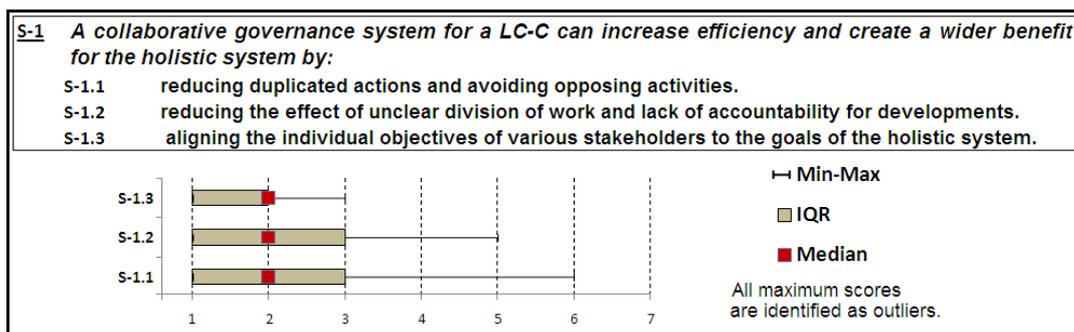


**Figure 9.3-35: Results – Competition 'Enabler'**

The structure of the competition enabler and its discussed properties are 'approved'. Most striking was the strong confirmation relating to inter-competition, especially when taking into consideration that the slightly contested notion of the low intra-gateway competition can be correlated with inter-gateway competition.

### 9.3.1.8 The governance enabler

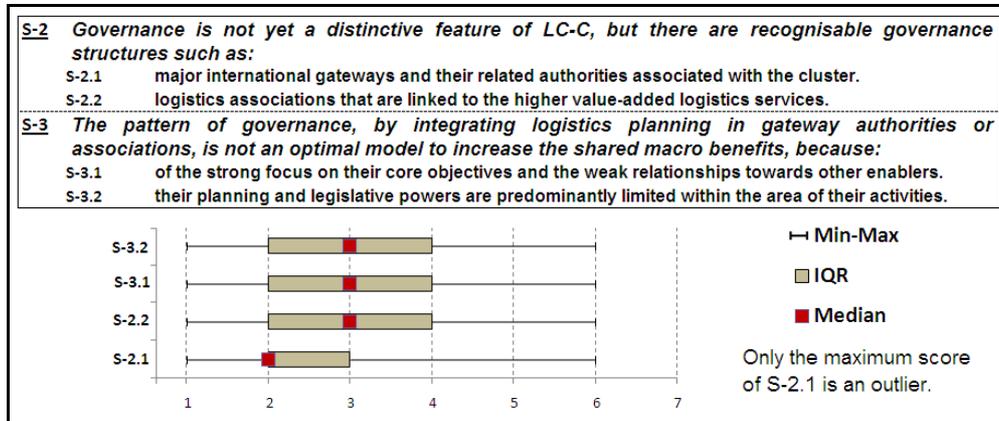
Governance is the integrating enabler that is seen as a platform through which the stakeholders are informed, guided and coordinated in a collaborative manner to achieve benefits for the cluster. The following statement (S-1) examines the necessity of governance (Figure 9.3-36).



**Figure 9.3-36: Results – Necessity of governance**

It is confirmed that the co-ordination of all stakeholders and their alignment is beneficial for the cluster. In this context, all described benefits of a collaborative governance system are approved. Hence, it is agreed that collaboration reduces duplicated actions, avoids opposing activities (S-2.1) and decreases the unclear division of work and lack of accountability (S-2.2). However, it appeared that alignment of individual objectives of various stakeholders to the overall goals of the system has the most beneficial effect (S-2.3), since responses are positively skewed having no disagreement.

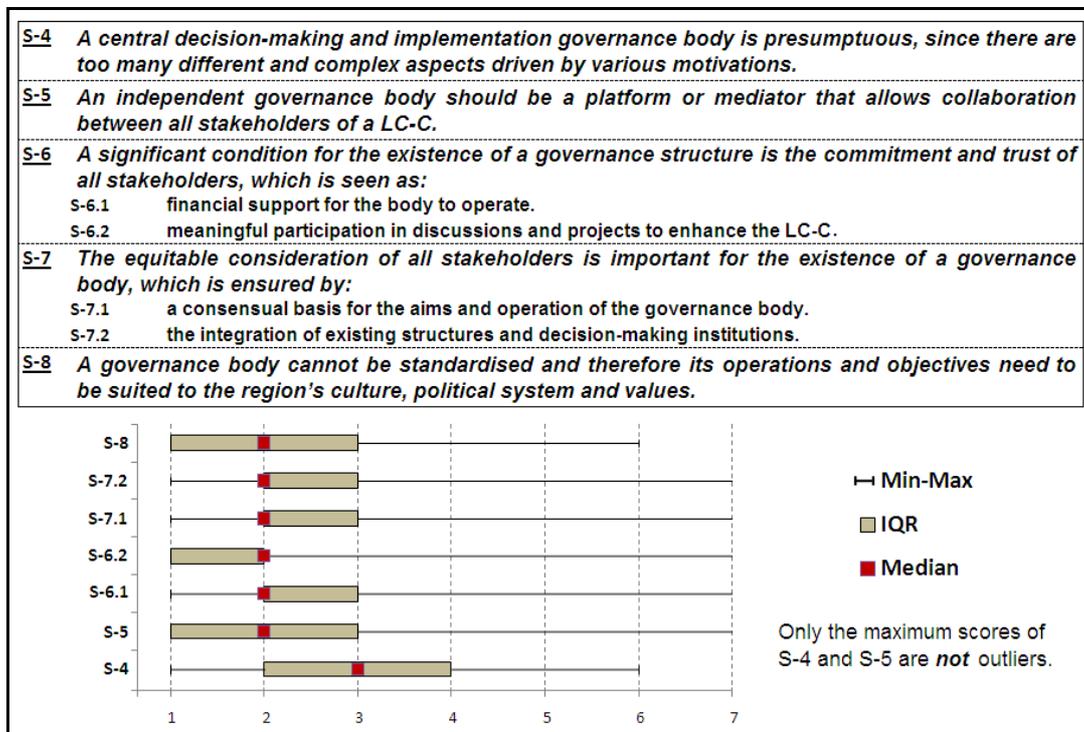
It further appeared that whilst there is no real governance in place, logistics planning is often linked to the gateway authorities and logistics associations. This pattern of planning and its understanding was presented for validation (S-2 and S-3), leading to the results visualised in Figure 9.3-37.



**Figure 9.3-37: Results – Current strategic logistics planning**

The participants confirmed that there are recognisable logistics governance structures at the cluster level. It became apparent that this is mainly associated with the core gateway authorities (S-2.1: median 2), whilst the strategic planning by logistics associations is not as dominant (S-2.2: median 3). There was only an appreciable regional difference, since the European participants have confirmed (median 2) and the Asia-Pacific region ‘somewhat approves’. This inconsistency may be explained by the early establishment of the logistics association in Europe and therefore the past-related stronger influence. The emphasis on the gateway authorities is not unexpected and was already established in Round II. Interestingly, the earlier observed limitations of an integrated logistics planning by gateway authorities or associations are contested (S-3.1 and S-3.2: median 3). For both statements there are only sectoral divergences. Industry is the most confirmative sector for both statements by clustering around a median of 2.5. Government instead represents the most non-confirmative tendency and accounts for nearly all disapprovals (S-3.2: median 3 / S.3.1: median 4). By contrast, academia strongly clusters around ‘somewhat approve’. A possible explanation for the clear difference between the government and industry perceptions can result from the fact that gateway authorities are commonly associated with government authorities. Hence, there might be a tendency for this sector to report that the current setup is satisfactory and only needs small amendments. Industry, having smaller involvement in the current strategic planning, has a less constrained position and agrees to possible limitations. Consequently, possible limitations on effective governance due to the strong self-interest focus, weak relationships to other enablers and restriction on administering legislative power exists.

It was generally found that an independent governance body, including all core stakeholders, is favoured to achieve and integrated logistics planning. The six conclusions S-4 to S-9 on a possible governance model were tested (Figure 9.3-38).



**Figure 9.3-38: Results – LC-C governance and its requirements**

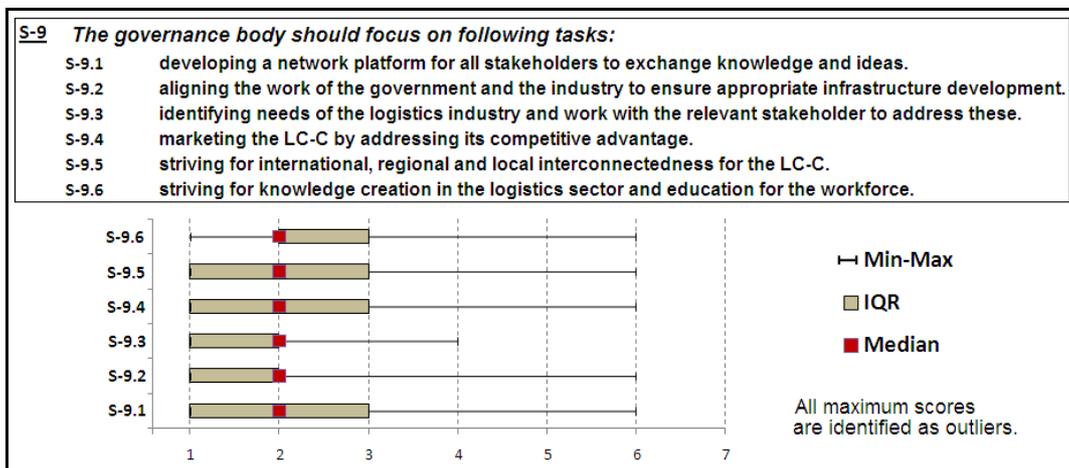
Interestingly, the statement that central decision-making and implementation governance structures are presumptuous, was ‘somewhat approved’ (S-4). First there is clear divergence in the sectors’ understanding. The government holds a ‘neutral’ position, the industry participants are more confirmative (median 2.5) and the academic sector is mid way (median 3). These perceptions are very similar to the earlier findings on the limitation of current strategic planning system. Certainly, it can be explained in parallel manner, which is further supported by following statement:

*Don't agree with this premise. ... Government should do this centrally.*

There is also a regional difference with the Asia-Pacific region ‘approving’ and Europe ‘somewhat approving’. This is possibly related to the political dissimilarity. The government in the Asian-Pacific region is a strong force and perhaps seen as central decision-making and implementation body, which is not as dominant in Europe. In this context, it might be that the non-government participants of the Asia-Pacific region want a more collaborative system involving all stakeholders. Despite these minor contested understandings, driven by the government, the actual requirements for a possible governance body are all confirmed (S-5 to S-8). First, it is ‘approved’ that a governance body should be a collaborative mediator (S-5), aligning with the conclusion

that central decision making can be challenging. Secondly, commitment and trust of all stakeholders is 'approved', whereas participation in projects (S-6.2) is slightly more essential than financial support (S-6.1). In the context of equitable stakeholder consideration, it is 'approved' that it enables a consensual basis of the governance body (S-7.1) and ensures that existing structures and decision-making institutions are not overlooked (S-7.2). Finally, there is a clear 'approval' that a governance structure needs to be suited to the region's culture, political system and values (S-8), which is unquestionably consistent with differential regional understandings prefigured in this investigation.

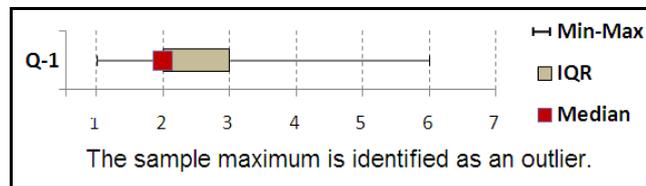
In Round II six core tasks for a governance body were derived, which are presented by the sub-statements of S-9. These were presented to the respondents for their validation (Figure 9.3-39).



**Figure 9.3-39: Results – Focus of a governance model**

The results for all six possible core tasks are in the 'acceptable' category. It appeared that aligning government and industry activities for appropriate infrastructure development (S-9.2) and the addressing of regulatory impediments of the logistics sector (S-9.3) is of particular importance. This supports the earlier finding that the infrastructure and logistics services are dominant functional elements of a Logistics City-Cluster. There was also 'approval', with the perceptions evenly distributed, that the governing body should be involved in the development of a network platform to exchange knowledge and ideas (S-9.1), the marketing of the cluster (S.9.4) and connecting it on a global level (S-9.5). Interestingly, although being approved, the governance task of striving for knowledge creation and workforce education (S-9.6) had the lowest confirmative level since it was negatively skewed.

After testing the detailed elements of the integration category, the participants were asked to either confirm or reject the interdependent nature of the governance enabler. Figure 9.3-40 illustrates the result obtained from the analysis.

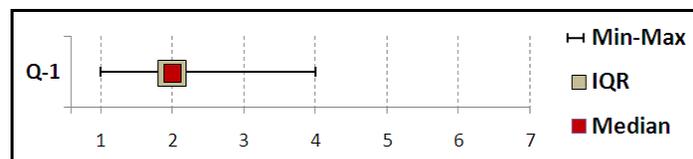


**Figure 9.3-40: Results – Governance ‘Enabler’**

The median and IQR are in the ‘acceptable’ category and the holistic structure of the governance enabler is ‘approved.’

### 9.3.2 Validation of the influence categories

The second core category of the Logistics City-Cluster model was identified as those influential factors that affect the enabling elements. At the more detailed level, two sub-categories were concluded: (i) the effects of politics and (ii) the influence of geography. These two influences are an imperative for the development of the cluster because of their dynamic interdependencies with the enablers, which can be obvious, subtle or reflexive. This was presented to the participants (Figure 9.3-41).



**Figure 9.3-41: Results – Setup of influence categories**

This twofold structure of the second Logistics City-Clusters core category is ‘approved’ having no disagreement and therefore geography and politics are clearly confirmed as the most dominant influential factors. However it is understood, as already indicated in Round II and also highlighted by various participants in Round III, there are more influential factors such as culture or chance.

#### 9.3.2.1 Analysis of the political influence

In Round II it was found that government actions can be favourable for the development of Logistics City-Clusters; however negative effects occur if there is inappropriate assistance creating a climate of dependency. Numerous political tools, which must also take into account the needs and well-being of other constituents in the administered area, were identified. These include such as direct / indirect subsidies, policies, regulations, scholarships or research grants. To test the specific influential

notions on each enabler, the statements were presented in a way that indicates the level of current government activities. Hence, instead of validating a ‘wish-list’ of government influential actions, this outcome will reflect common existing government activities in leading clusters.

### 9.3.2.1.1 Influence on market size and quality

Having concluded that the size and quality of the markets are the major areas of political influence, possible government actions affecting these two parameters were reflected upon by the participating clusters (S-1 to S-4), as shown in Figure 9.3-42.

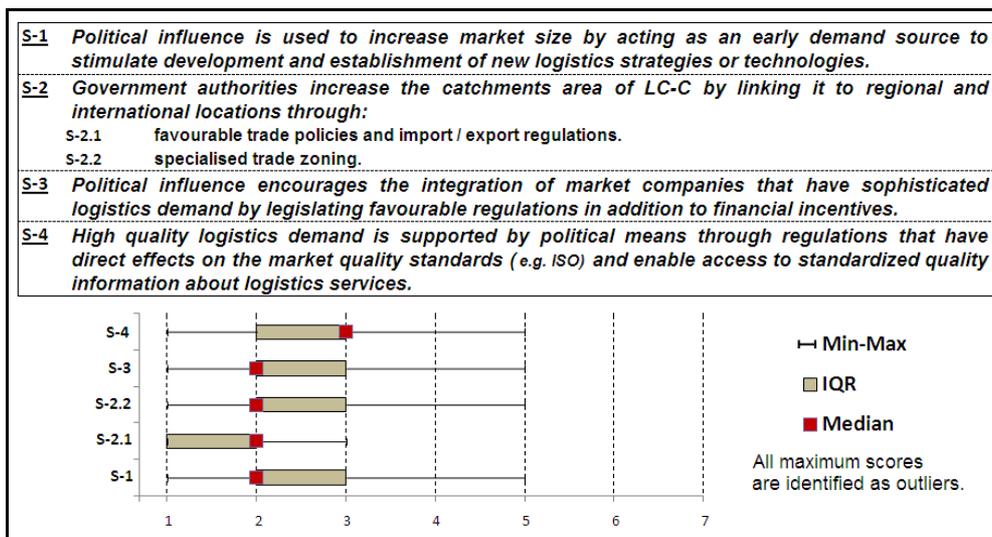


Figure 9.3-42: Results – Political influence on market size and quality

It is ‘approved’ that the governments act as an early demand source to stimulate development of new logistics strategies or technologies (S-1). Further it is confirmed that authorities increase the market size by widening the catchment areas. However, it appeared that trade policies, import / export regulations including customs guidelines (S-2.1) are the favourite tool. Specialised trading zones are also approved (S-2.2), but seem slightly less important (negatively skewed). One participant stated:

*Commonly free zones are free of customs inspection, in Saudi Arabia the free zones are subject to strict customs import supervision because of cultural and religious concerns. The success of such projects is consequently quite limited.*

Regulations can certainly impact on free zones, which support the slightly more dominant rating of S-2.1. Additionally it indicates that cultural or religious norms are integrated in the governments’ regulations as an influential factor, which strengthens the core role of politics. The result for S-3 is in the acceptable category, and ‘approves’ that authorities integrate leading market companies in their cluster by favourable regulations and incentives. Despite this confirmation, the final statement in regard to enhancing quality levels is contested (S-4: median 3). When disaggregating the data,

appreciable differences appeared only for the sectors. Whereas the enhancement of quality levels through regulations that have direct effects on the market is ‘approved’ by academia, there is a ‘somewhat approval’ from the government participants. The industry sector has a more confirmative tendency (median 2.5). Indeed, the ‘somewhat approval’ of government participants needs to be weighted stronger because of their remit. Hence, it is concluded that the influential tools regarding the market quality are currently applied on a moderate level.

### 9.3.2.1.2 Influence on the infrastructure

It was identified in the interviews that the development of physical infrastructure is an element that is strongly influenced by planning schemes and regulations. There are three major notions and sub-conclusions (S-1 to S-3) concerning the political effects on the quality and quantity of infrastructure that were tested (Figure 9.3-43).

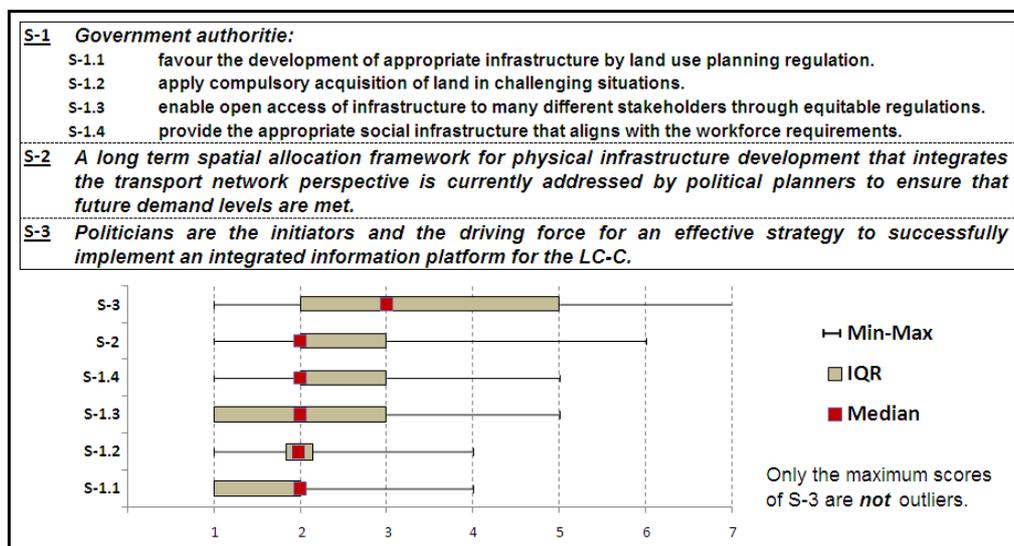


Figure 9.3-43: Results – Political influence on infrastructure

The influence on the physical development of infrastructure and its accessibility is confirmed. First, it is ‘approved’ that authorities favour the development of appropriate logistics infrastructure by land use planning regulation (S-1.1), which also includes social infrastructure aligned to workforce requirements (S-1.4). Second, to support infrastructure development the authorities apply compulsory acquisition when necessary (S-1.2). Third, it is ‘approved’ that authorities enable adequate access of infrastructure to all necessary stakeholders by transparent regulations (S-1.3). Most importantly it is ‘approved’ that governments employ long term planning to ensure a structured infrastructure development (S-2). There is, however, a contested understanding that governments are the driving force for a strategy to successfully implement an integrated information platform (S-3: median 3). When disaggregating

the data, different regional and sectoral perceptions appeared. The industry and government perspectives are ‘neutral’ accounting for all eight disagreements, whereas the academic participants ‘somewhat approve’. It appeared that this is less integrated in Europe (median 4) then in the Asia-Pacific region (median 3). Both industry and government are the core stakeholders and therefore it is concluded that authorities as a driving force for an integrated information platform is currently limited. In particular, one government participant argued:

*[P]olitical influence ... is only about physical infrastructure provision and regional planning.*

This result might be explained by the fact that IT is a dynamic sector and its virtual component is not part of the classical influential areas of authorities. Hence, governments’ current influential position is moderate.

### 9.3.2.1.3 Influence on the service enabler

In Round II it was concluded that the attraction of quality logistics and supporting services is the core focus of political influence. Additionally, the notion of co-ownership and the actual operation of logistics functionalities by authorities were observed. These core ideas were tested in statement S-1 to S-3 (Figure 9.3-44).

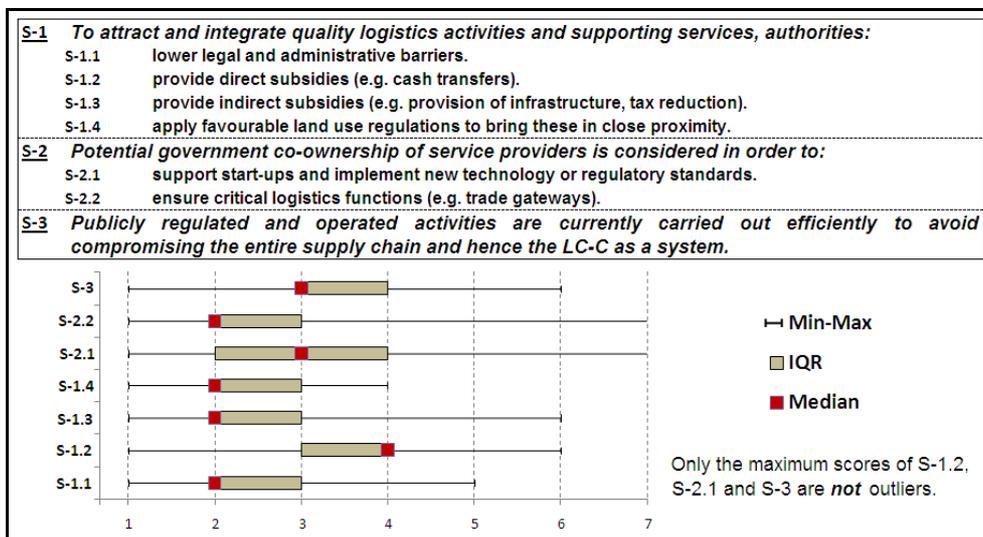


Figure 9.3-44: Results – Political influence on the service enabler

The government tools regarding the attraction and integration of economic activities are weighted differently. Lowering legal and administrative barriers (S-1.1), providing appropriate indirect subsidies (S-1.3) and the application of favourable land use regulations (S-1.4) are widely used instruments (median 2). On the other hand, the provision of direct subsidies is strongly contested (S-1.2: median 4). When disaggregating the data, only divergences within the sectors were observed. The industry participants ‘somewhat approve’, whereas the government sector perspective

is 'neutral', accounting for most of the disagreements. The academic participants are once more a neutral pole (median 3.5). This result is not surprising and supports the finding of Round II that exaggerated government direct subsidies without reasoning can create a climate of dependency. There is also a contested result when stating that government co-ownership is considered to support start-ups and new technology (S-2.1: median 3). After reviewing the data, it was found that all sectors and regions 'somewhat approve'. Hence, whilst this reason for co-ownership is moderately evident, it is not as important which might result from the earlier confirmed lower innovation intensity. However, the correlation of government co-ownership in critical logistics functions is 'approved' (S-2.2). This again indicates the importance of governments for areas in which single private power is limited. The result for the S-3 is contested (median 3), only having an appreciable sectoral divergence. Interestingly, the governments' tendency is towards 'neutral', whereas the industry sector (median 3) and the academic participants (median 3.5) are more confirmative. This result is somewhat unanticipated, since the government sector is admitting lower efficiency. Certainly, it is concluded that these activities have the potential to increase their competence to avoid compromising the cluster as a system.

#### 9.3.2.1.4 Influence on the workforce enabler

The governments' core influential on the workforce is associated with its quantity and quality. In this context, the interaction with the private sector is critical. The following influence factors to avoid labour scarcity and to ensure appropriate workforce skills were tested (S-1 to S-3) and the validation is visualised (Figure 9.3-45).

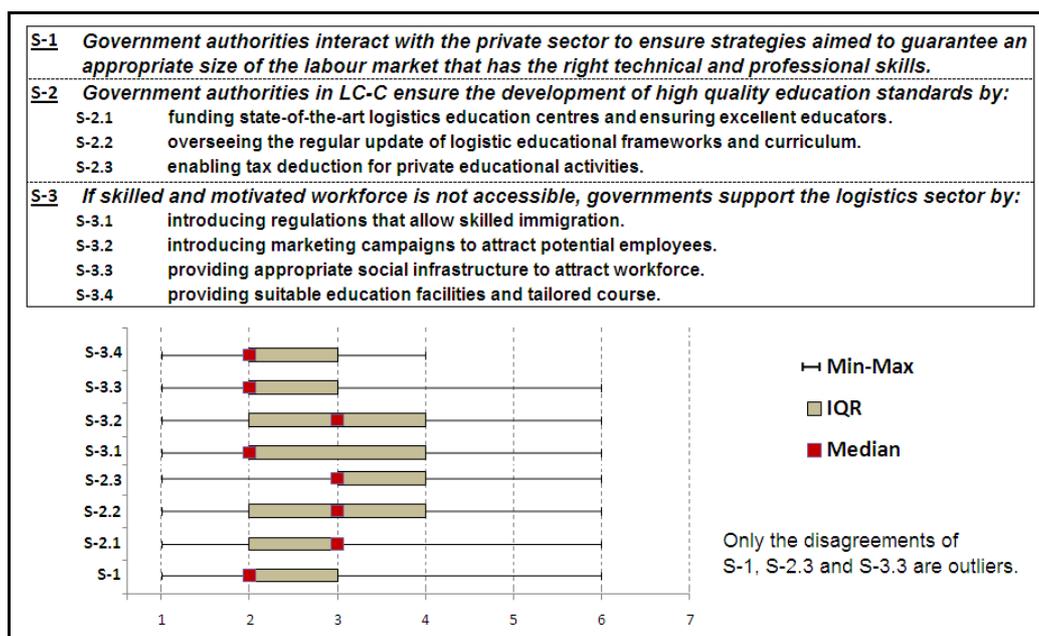


Figure 9.3-45: Results – Political influence on the workforce enabler

The role of authorities to ensure adequate workforce strategies to guarantee appropriate size and quality of workforce, whilst interacting with the private sector, is 'approved' (S-1: median 2). Consequently, workforce development is not only addressed by the government, but there is a strong linkage to industry, as one participant commented:

*[Government] is important but private formal educational institutions need to be considered.*

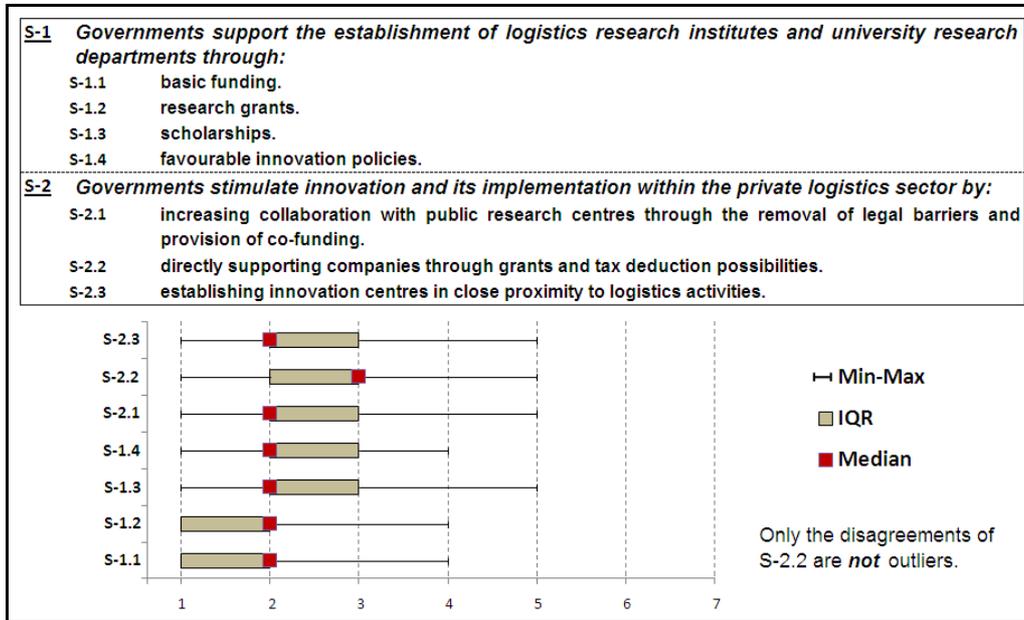
Interestingly, all results in regard to government activities ensuring high quality education standards are contested. The support for state-of-the-art logistics education centres, including the availability of excellent educators (S-2.1) and the regular update of educational curriculum (S-2.2) are 'somewhat approved'. When disaggregating the data, no appreciable sectoral and regional divergences were observed. The reason for these unexpected outcomes is not clear, but might be based on the earlier finding that the involvement of independent logistics education providers lowers the necessity of government involvement. Additionally, government influence due to tax deductions for private educational activities is contested (S-2.3: median 3). Only different perceptions between regions appeared. The European participants have a slight tendency towards 'neutral', whilst the Asia-Pacific region 'somewhat approves' (positively skewed). Certainly, the trend indicated in Round II that industry is taking more responsibilities regarding workforce education, such as involvement in education curricula, is strengthened. This, however, does not lower the importance of government influence which should not only be activated as an emergency force that acts when workforce scarcity appears (S-3). In this context it is 'approved' that governments introduce regulations allowing skilled immigration (S-3.1), develop appropriate social infrastructure (S-3.3) and education facilities (S-3.4). Conversely, governmental marketing campaigns to attract potential employees are not clearly confirmed (S-3.2: median 3). There is an obvious regional divergence, since government-initiated campaigns are more likely in the Asia-Pacific region (median 2) than in Europe (median 3). Further, whilst industry 'approve', the government and academic sectors 'somewhat approve'. This might be because these campaigns are not directly initiated by the government, but rather by industry which then receive support by the authorities, as hinted in following comment:

*It's not always the government initiating marketing campaigns. It's mostly the industry which then gets government support.*

Indeed, this understanding is supported by the earlier finding within the workforce enabler, stating that marketing campaigns are driven in collaboration with industry and education providers.

### 9.3.2.1.5 Influence on the knowledge enabler

Stimulation of innovation is a key area for government intervention. Their influence focuses on publicly driven research platforms but also within the private logistics sector. Two core conclusions (S-1 and S-2) regarding possible strategic government tools are derived and the confirmative results are visualised in Figure 9.3-46.



**Figure 9.3-46: Results – Political influence on the knowledge enabler**

The respondents ‘approved’ the governments’ role towards logistics research institutes and university departments (S-1.1 to S-1.4). However, there is some suggestion in the data that basic funding (S-1.1) and research grants (S-1.2) are more frequently utilised as compared to scholarships and favourable innovation policies (S-1.3 and S-1.4: negatively skewed). These results align to the earlier finding that public funded research centres and university departments are strong drivers in the actual process of logistics innovation. Generally it is confirmed that governments stimulate innovation within the private logistics sector (S-2.1 and S-2.3), although there are differences in current utilisation of the identified tools. First, removing legal barriers and providing funds to increase public-private collaboration (S-2.1) and the development of research platforms in close proximity to logistics activities (S-2.3) are ‘approved’. Secondly, the direct assistance of logistics companies through grants and tax deduction (S-2.2) is only ‘somewhat approved’. Analysis of the data indicated differences in the sectors. Whilst the academics ‘approve’, government and industry tend to ‘somewhat approve’. Indeed, both industry and government are the core stakeholders here; therefore their perception is of greater importance. Further, this result also correlates with the contested finding in the knowledge enabler regarding direct industry grants. Hence, it is

concluded that direct financial support exists on a moderate level, whilst the support towards collaborative activities and dedicated research centres is preferred.

### 9.3.2.1.6 Influence on the capital enabler

It was concluded that authorities' influence on the capital enabler is mainly associated with infrastructure funding. However, there is also a certain level of influence towards the accessibility and conditions of capital needed by the logistics industry. These notions were assessed by statements S-1 to S-3 (Figure 9.3-47)

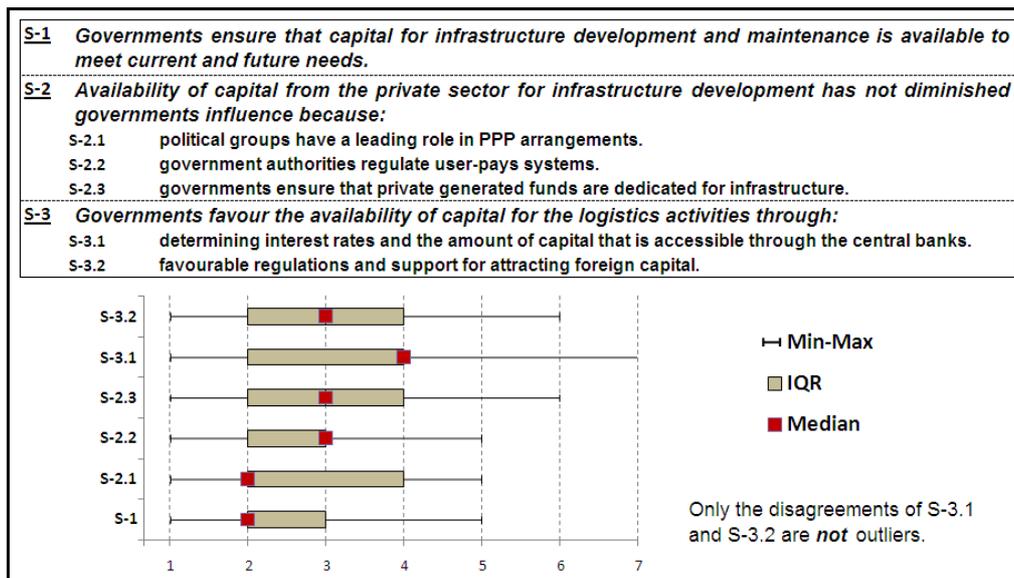


Figure 9.3-47: Results – Political influence on the capital enabler

The respondents 'approved' the critical importance of governments to ensure capital for infrastructure developments and maintenance (S-1). The finding that the private sectors' involvement has not diminished governments' influence is slightly contested; although it is 'approved' that political groups have a leading role in PPP arrangements (S-2.1). Authorities' strong regulating power towards user-pays systems (S-2.2.) and their influence to ensure that privately generated funds are dedicated for infrastructure (S-2.3) are only 'somewhat approved'. For both statements the sectoral divergences are very similar. The academic and government participants cluster around the median of 3, whereas the industry sector 'approves'. This might be explained by the fact that the even the slightest loss of power is felt more intense (government) than a minor increase in influence (industry). The reasoning is based on subjective perceptions and is therefore similar to the earlier discussion of government focus on the positive effects, rather than negative implications. Consequently, it is concluded that the involvement of the private sector has slightly diminished the political influence; however governments are still the dominant factor.

The general concern that governments favour capital availability for logistics activities through interest rates and the accessible amount of capital is strongly contested (S-3.1: median 4). Indeed, government and industry have a ‘neutral’ perception, whereas the academic participants are more affirmative (median 2.5). Additionally, the finding that governmental influence on capital conditions is associated with favourable regulation and attracting foreign capital is ‘somewhat approved’ (S-3.2). Academia ‘approves’ the notion, whereas the government sector has a ‘neutral’ perception. The industrial respondents on the other hand ‘somewhat approve’. The outcome for the two direct political influences on the capital may result from the fact that the notion of capital and its associated availability and conditions is mainly driven by private stakeholders, as supported by the industrial and government ratings. Certainly, it seems that the neo-liberal economic principles of free market forces are the core drivers. Hence, both influential tools of governments are valid only on a moderate level and as indicated earlier the governments influence is more subtle due to regulations which are applied by the private financial institutions.

### 9.3.2.1.7 Influence on the competition enabler

The observed influential strategies to stimulate intra- and inter-competition, such as the reduction of legal / administrative entry barriers or price guidelines, are commonly associated with the demand size and its related possibilities to host sufficient logistics operators. In this context, three core aspects and various sub-conclusions are tested by statements S-1 to S-3 (Figure 9.3-48).

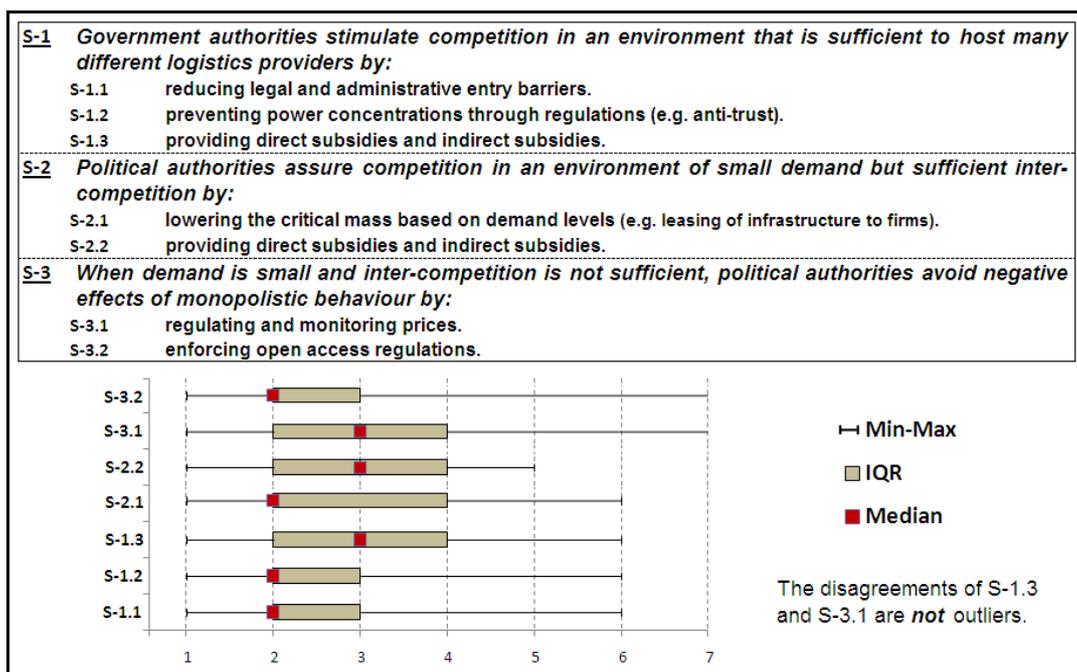
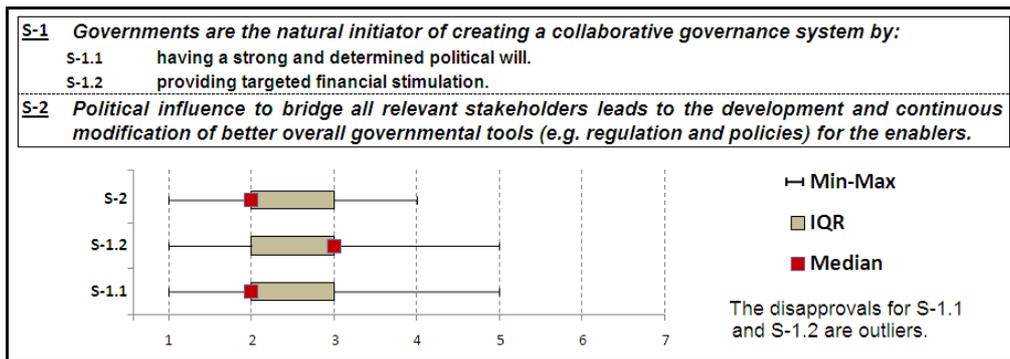


Figure 9.3-48: Results – Political influence on the competition enabler

The stimulation of competition in an environment that has a sufficient market sizes by reducing legal / administrative entry barriers (S-1.1) and employing regulations preventing monopolies (S-1.2) are 'approved'. The provision of direct and indirect subsidies, however, was only 'somewhat approved' (S-1.3), having a minor divergence in the sectors. Academic and government participants 'somewhat approve', whereas the industry is slightly more confirmative (median 2.5). The more confirmative industry rating might result from the possible economic benefit for their operation, whereas the neutral government perception may be due to their approved budget constrains. Nevertheless this outcome is not unexpected and aligns with the results of political influence on the service enabler. Hence, direct exaggerated political assistance in regards to a sufficient market size is not favoured, since it can create a climate of dependency. Regarding observed strategies assuring competition associated with smaller demand but sufficient inter-competition, the scheme of lowering the critical mass of demand by granting infrastructure to firms that compete on operational level is 'approved' (S-2.1). However, the provision of direct / indirect subsidies (S-2.2) are only 'somewhat approved'. Close analysis indicates only an appreciable difference in the sectors. The academic and industry sector 'somewhat approve', whereas the governments' perception is 'neutral'. Again it indicates that schemes involving and challenging the private sector are favoured and that exaggerated political assistance may only be provided preferred in critical circumstances. In case of small demand and insufficient inter-competition, governments enforce regulations allowing open access such as for gateways (S-3.2: median 2). However, the notion of authorities regulating and monitoring prices is contested (S-3.1: median 3). There is only a major regional difference observed. Whereas the participants from Asia-Pacific region 'approve', the European respondents tend towards 'neutral'. Certainly, it can be concluded that this strategy is strongly linked to the regional system.

#### **9.3.2.1.8 The influence on the governance enabler**

In Round II it was concluded that politics can be a driver for a collaborative governance system through regulatory and financial stimulation. Therefore, the following statements S1 to S-2 were tested with the respondents and the outcomes revealed in Figure 9.3-49.

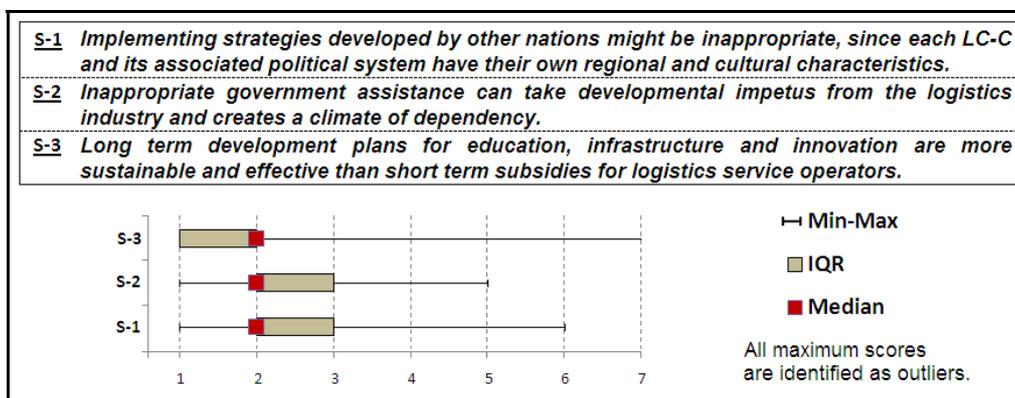


**Figure 9.3-49: Results – Political influence on the governance enabler**

The participants confirmed that the government is a natural initiator for a collaborative governance system. However, its driving force arises from determined political will (S-1.1: median 2), rather than financial stimulation (S-1.2: median of 3). There are sectoral and regional differences for S-1.2. Whilst the government participants ‘somewhat approve’ (negatively skewed), the industry and academic sector are more confirmative (median 2.5). The Asia-Pacific region ‘approve’ (negatively skewed) and European respondents cluster around ‘somewhat approve’. This minor inconsistency is difficult to explain, but may be due to the current financial constraints of European governments. More importantly, it is confirmed that a collaborative governance body leads to the development and continuous modification of better overall government tools for the enablers (S-2: median 2).

### 9.3.2.1.9 General notions on the political influence

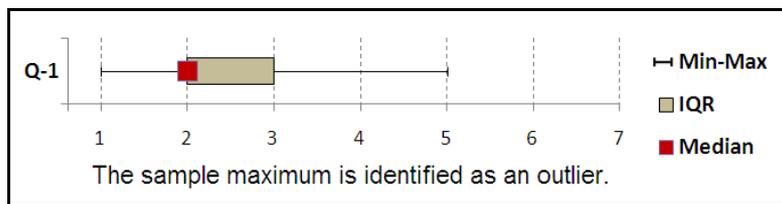
There are also general conclusions that are associated with the effect of political influence upon a Logistics City-Cluster. These important generic understandings, encapsulated in statements S-1 to S-3, were presented to the respondents for confirmation (Figure 9.3-50).



**Figure 9.3-50: Results – General notions on political influence**

S-1 is confirmed and therefore the alignment of strategies to regional and cultural characteristics is ‘approved’. There is also a clear approval that long term development for education, infrastructure and knowledge enablers are more sustainable than short term subsidies (S-3). In this context, the earlier finding that inappropriate political assistance can take developmental impetus is ‘approved’ (S-1).

After testing the detailed elements of the political influence category, the participants were asked to either confirm or reject the category on a. Figure 9.3-51 illustrates the obtained result.

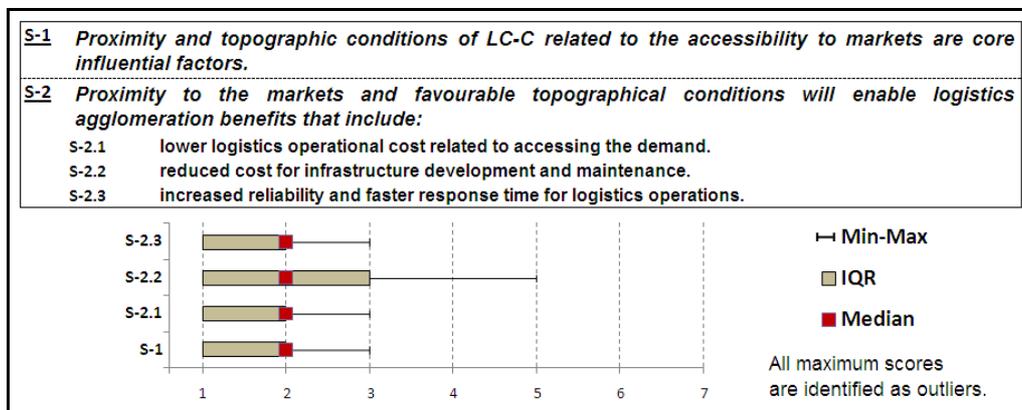


**Figure 9.3-51: Results – Political Influence on the enabler categories**

Clearly, the outcome regarding the generic structure falls into the ‘acceptable’ category and the usefulness of the political influence category is confirmed, having a tendency towards the confidence level of ‘approve’.

### 9.3.2.2 Analysis of the geographical influence

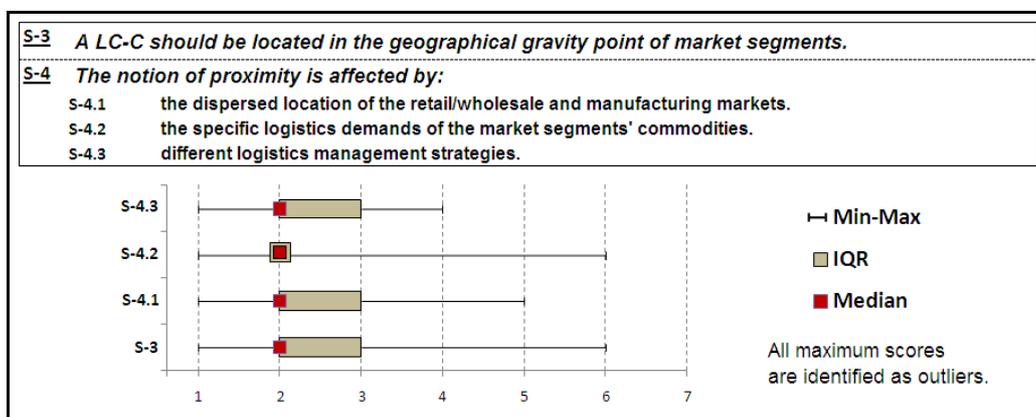
When evaluating the development of a Logistics City-Cluster, the geographical circumstances, which influence the enablers both in obvious and subtle ways, need to be considered. First, is the effectiveness of connecting with markets that depend largely on the geographical proximity and topographical barriers of the location, as was tested by core statements S1 and S-2 (Figure 9.3-52).



**Figure 9.3-52: Results – Geography as a market accessibility factor**

There is a clear ‘approval’ that proximity and topographic conditions are core influential factors (S-1). It was further confirmed that close proximity and favourable topographical conditions are beneficial. However it appeared that the benefits of lower logistics operational cost (S-2.1), faster response time and the increased reliability of the operations (S-2.3) are dominant. The beneficial effect of reduced cost for infrastructure due to favourable topographical characteristic (S-2.2) is seen slightly less significant, as indicated by the IQR.

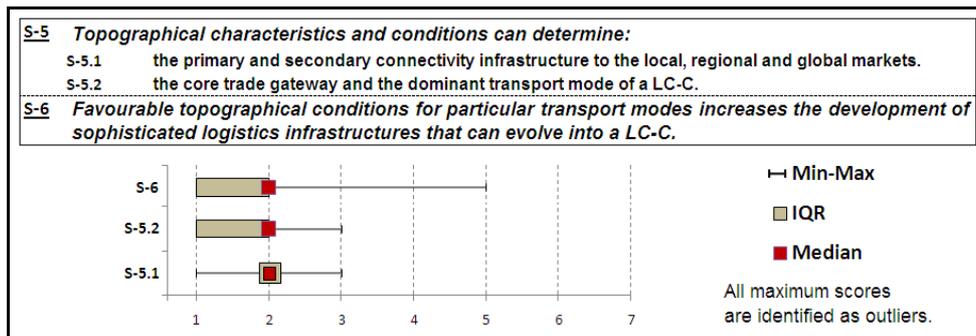
Secondly, in the context of market proximity it was found that Logistics City-Clusters should be located in the centre-of-gravity of market segments, which however is dependent upon various factors. Market proximity and its associated depend factors were tested by statements S-3 and S-4, as presented in Figure 9.3-53.



**Figure 9.3-53: Results – Proximity to market as an accessibility factor**

It is clearly ‘approved’ that it is advantageous for a Logistics City-Cluster to be located in the market centre-of-gravity (S-3). The elements that determine the proximity are also confirmed. Based on the skewness of the data, it appeared that the dispersed location of the market segments (S-4.1) and logistics management strategies (S-4.3) are less dominant factors than the specific logistics demands of the commodities (S-4.2). Certainly, there are many more aspects when considering market proximity, which further include the notion of past dependency and the reinforcing cycle of agglomeration as discussed in the last paragraph of this category.

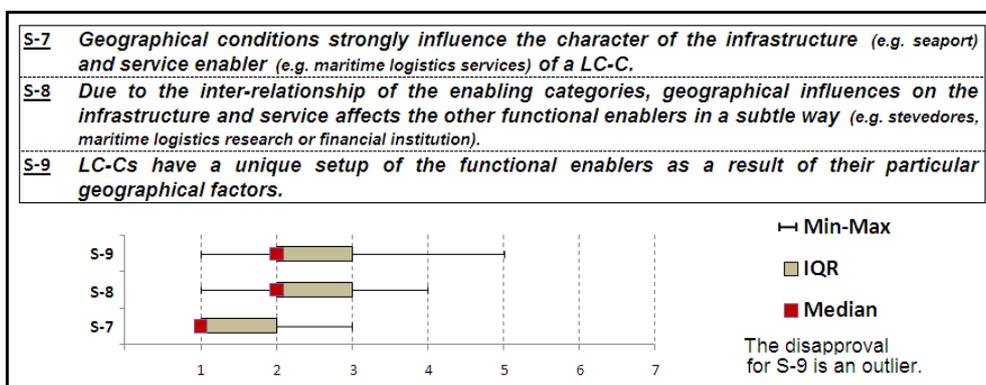
Third, topographical characteristics can predefine connectivity to diverse markets and in many instances led to the initial establishment of the trade gateway, which then can evolve into sophisticated Logistics City-Clusters based on the confirmed benefits. In this context core conclusions S-5 and S-6 were tested (Figure 9.3-54).



**Figure 9.3-54: Results – Topographical conditions as an accessibility factor**

The results for all statements are in the acceptable category and ‘approve’ the way in which the respondents’ comments in Round II were interpreted. It was strengthened that the topographical influence is stronger towards transport infrastructure (S-5.1), than the core trade gateways (S-5.2). Certainly, favourable topographical condition for particular transport modes increases the chances of sophisticated logistics infrastructures that can evolve into a Logistics City-Cluster (S-6).

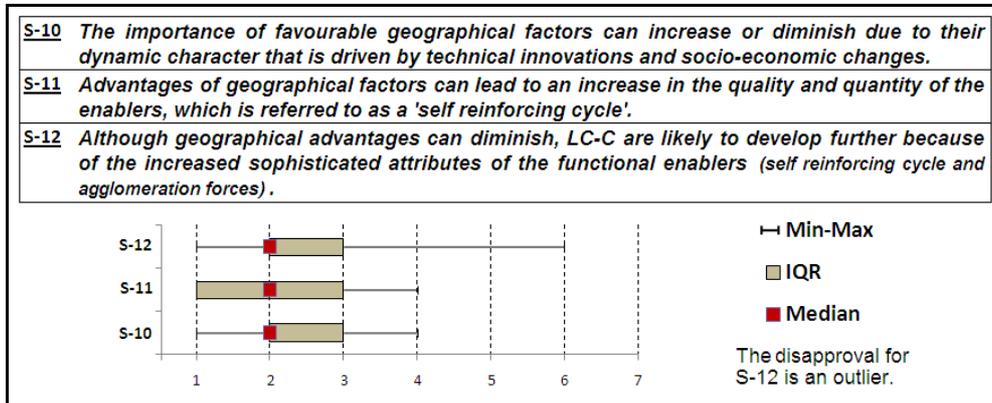
Fourth, the notion of proximity and topography further influences the functional enablers. The direct effects of geography upon the infrastructure and service enabler influence in a subtle way the other functional enablers through their mutual inter-relationships. These understandings embodied in S-7 to S-9 were presented for confirmation (Figure 9.3-55).



**Figure 9.3-55: Results – Geography’s influence on the functional enablers**

The results for the statements S-7 to S-9 are in the ‘acceptable’ category. It is ‘strongly approved’ that geographical conditions influence the character of the infrastructure and service enabler’s (S-7). Due to the inter-relationship of the enabling categories the other functional enablers are also affected, albeit in a more subtle way (S-8: median 2). Additionally it is ‘approved’ that due to individual geographical characteristics, clusters have a unique setup of functional enablers (S-9).

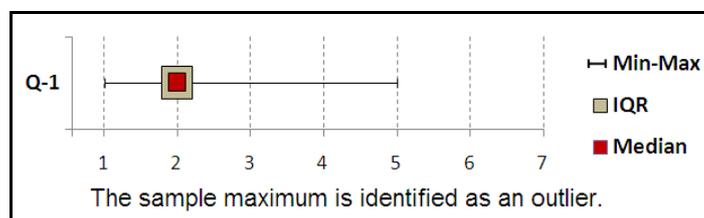
Fifth, it was concluded that the geographical factors are dynamic and past dependent. Hence, they can lose their driving force over time; however, the geographical induced intensification in quality and quantity of the functional enablers facilitates further growth. Three core conclusions are tested (S-10 to S-12) and the results shown in Figure 9.3-56.



**Figure 9.3-56: Results – Geography a past dependent factor**

The respondents ‘approved’ that geographical characteristics are dynamic due to technical innovations and socio-economic changes (S-10). Hence, favourable conditions can diminish and vice versa. Importantly, beneficial geographical factors can be the initiator of a self-reinforcing cycle that increases the quality and quantity of the enablers (S-11: median 2). In this regard, the self reinforcing cycle and associated agglomeration forces can buffer the dynamic character of geographical conditions (S-12: median 2) and allow further development and growth of Logistics City-Clusters.

After testing the conclusions of Round II, the participants were asked if they agree with the way in which the determinants of the geographical influence category are drawn together (Figure 9.3-57).



**Figure 9.3-57: Results – The influence of geography on the enablers**

The results indicate a clear ‘approval’ of the generic geographical influential character. This is evidently supported by the fact that there was no contestation in the micro conclusions and that all disapproval ranking were identified as outliers. Hence, this category is a very robust part of the wider framework.

### 9.3.3 Validation of the impact categories

The impact agents are the lower and higher value logistics services located in the administrative metropolitan boundary of a Logistics City-Cluster and these effects on the surrounding region are discussed in the light of the triple bottom line approach. Hence, the impact category is segmented into the economic, environmental and social dimension, and this interim classification and understanding was presented to the participants for validation and the results are shown in Figure 9.3-58.

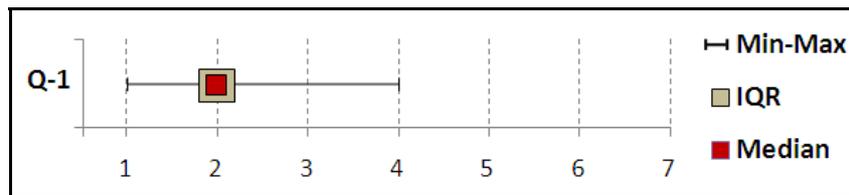


Figure 9.3-58: Results – Structure of the impact category

The median and IQR fall into the ‘acceptable’ category and confirm the structure of impact category, with perceptions clustering around the confidence level of ‘approve’. There was one powerful comment in this regard:

*Sustainability is becoming more than just a buzzword. Without a clear sustainable strategy, logistics companies tend to lose business, which is [reflected] in the cluster.*

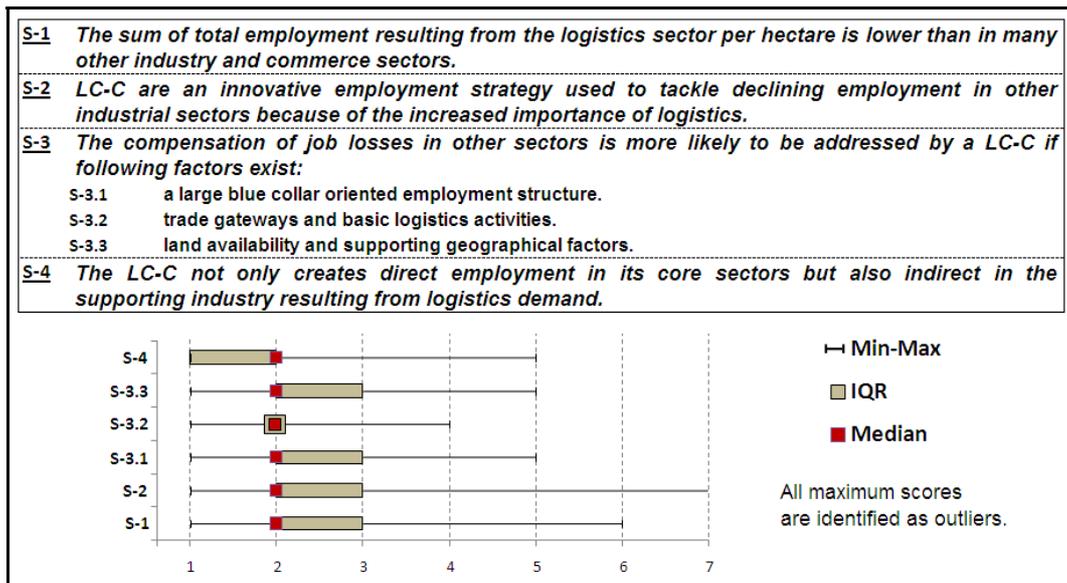
This strongly supports the earlier finding that the impact needs to be considered at the threefold level.

#### 9.3.3.1 Analysis of the economic impact category

The economic impact of logistics activities is classified into four categories: the *employment opportunities*; the *value-add to goods* generated in the region; the *revenue streams* for governments due to logistics related tax and duties; and the *income for the workforce* that inherit flow-on effects resulting in further creation of value, jobs, tax and income.

##### 9.3.3.1.1 Employment opportunities

In Round II it was concluded that the logistics sector is an innovative regional employment strategy that enables direct and indirect job opportunities. Four core conclusions were tested in statement S-1 to S-4 (Figure 9.3-59).

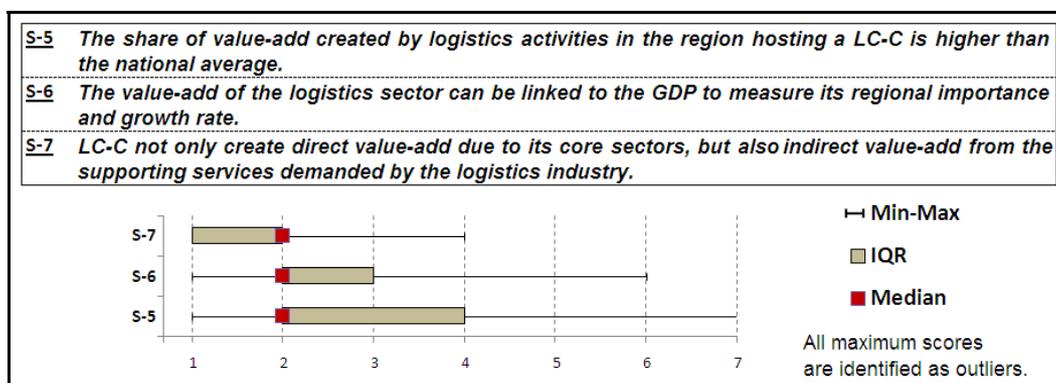


**Figure 9.3-59: Results – The pre-eminence of employment opportunities**

Despite the fact that employment per hectare is lower than in many other commercial and industrial sectors (S-1: median 2), a Logistics City-Cluster is ‘approved’ as an innovative employment strategy (S-2). In this context, the factors that increase the likelihood of compensating other sectors job losses are ‘approved’. It appeared that the land availability in combination with favourable geographical factors (S-3.3) and a blue collar oriented employment structure (S-3.1) are less important drivers than the existence of gateways and basic logistics services (S-3.2). Further it is ‘approved’ that there are indirect employment effects (S-4).

### 9.3.3.1.2 Importance of value-add

Logistics activities are stimulating the regional economy by increasing the value that is created in the region. Beyond this initial round of logistics value creation, there are also indirect value-add effects. In this regard, conclusions S-5 to S-7 were presented for confirmation (Figure 9.3-60).



**Figure 9.3-60: Results – The importance of value-add**

The median and the IQR for S-5 to S-7 are located in the ‘acceptable’ category and ‘approve’ the interpretations from Round II. Hence, the logistics value-add in the region hosting a cluster is much higher than the national average (S-5). Its actual regional importance and growth can be identified and analysed by the evaluation of the GDP (S-6). Furthermore, there is also indirect value-add from the supporting services (S-7.1) and induced value-add based on expenditure associated to income generated from the logistics sector (S-7.2).

### 9.3.3.1.3 Income for governments and the workforce

The direct and indirect revenue streams for governments due to tax and duties have an important consequence, since these provide the subtle means to further enhance the enablers such as the social infrastructure. This notion of government revenues was tested (S-8 to S-15) and the results visualised in Figure 9.3-61.

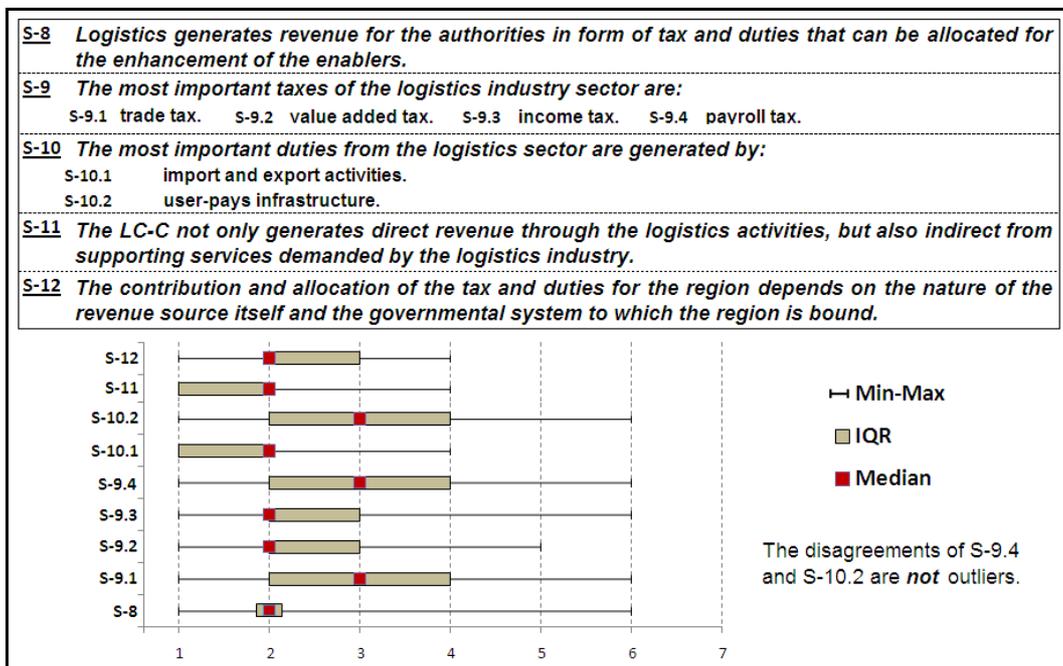
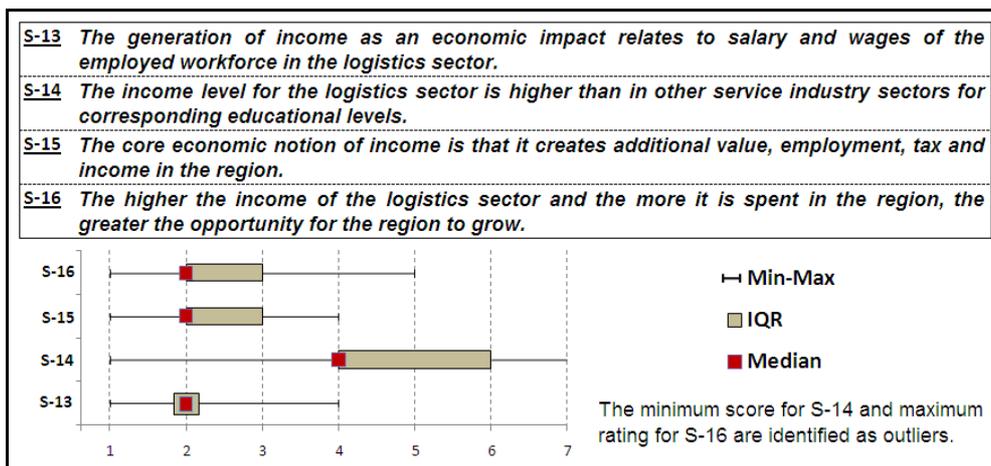


Figure 9.3-61: Results – Tax and duties as government revenue

It is ‘approved’ that the revenue based on logistics activities for authorities can be used to develop and enhance the enablers (S-8). In this context, it is also confirmed that there are indirect government revenue (S-11). Whilst all the identified taxes contribute to the government as revenues, it appeared that these have a different magnitude. First, it is perceived that the value-add (S-9.2) and income tax (S-9.3) are significant revenue streams, since they are clearly ‘approved’. Secondly, the trade (S-9.1) and payroll (S-9.4) seem to be of lower importance since they are ‘somewhat approved’. There is only a regional difference for both statements. The European participant ‘somewhat approve’, whilst the Asia-Pacific region ‘approves’, indicating the regional

differences in tax-systems. Similar outcomes are observed regarding the duties as revenue. It appeared that the duties generated from infrastructure user-pay systems (S-10.2: median 3) are not as significant as the import / export duties (S-10.1: median 2). Surprisingly, there are no regional or sectoral divergences. The ‘somewhat approval’ for S-10.2 is not unforeseen, since it aligns with the earlier finding that the authorities’ influence towards the generated funds of user-pay systems is limited due to private involvement. Further, it is ‘approved’ that the tax and duties might not fully contribute the region (S-12), since the allocation depends on the nature of the revenue source and the associated governmental system.

Income to employees working in logistics was also concluded as an economic impact. It was identified that the core effect here is that the income induces flow-on effects that result in further value, jobs, tax and income. The notions on income, encapsulated in statements S-13 to S-16, were tested (Figure 9.3-62).



**Figure 9.3-62: Results – Generating income for the workforce**

The respondents ‘approved’ the workforces’ income as an economic impact (S-13). There is, however, a strong contested perception regarding the comparison of income levels with other service sectors (S-14). The disaggregation of the data indicated sectoral differences. Industry is the most confirmative by being ‘neutral’, whilst academia clusters around 4.5 and the government ‘somewhat disapproves’. The most interesting finding here is that only few approval ratings occurred. Hence, it is concluded that the level of payment in the logistics sector, although being correlated to skill levels, is modest when comparing to other sectors. Further the core economic notion of income; the creation of additional value, employment, tax and income; is ‘approved’ (S-15). Therefore, it is not surprising that the correlation between high income in the logistics sector, spent in the region, and regional growth is confirmed (S-16: median 2).

### 9.3.3.1.4 General notion of the economic impact category

Finally, the respondents were asked to either confirm or reject the generic understanding of the economic impact category. Figure 9.3-63 illustrates the result obtained from the analysis.

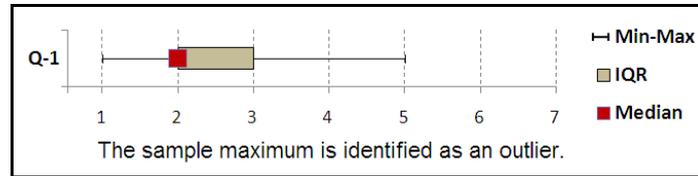


Figure 9.3-63: Results – The economic impact category

Indeed the structure and understanding of the economic impact category, including its earlier discussed properties, is 'approved', giving further confidence in the model.

### 9.3.3.2 Analysis of the environmental impact category

The environmental impact category can be segmented into three major elements: (i) *pollution* that causes hazards to the surrounding environment; (ii) *degradation of land and water areas* due to its utilisation by the logistics sector, and (iii) the notion of *odour, noise and visual appearance*. However the *rising awareness of the challenging situation* induced by the by economic imperatives of Logistics City-Clusters led to *strategies aiming at the reduction of hazardous environmental impact*.

#### 9.3.3.2.1 The effects of logistics activities on the environment

Regarding the first impact element of pollution, emissions emerged as the most concerning effect. However pollution also refers to land and water contaminations, which appear primarily along the trade corridors and within gateways. Three core ideas (S-1 to S-3) were tested and the results are visualised in Figure 9.3-64.

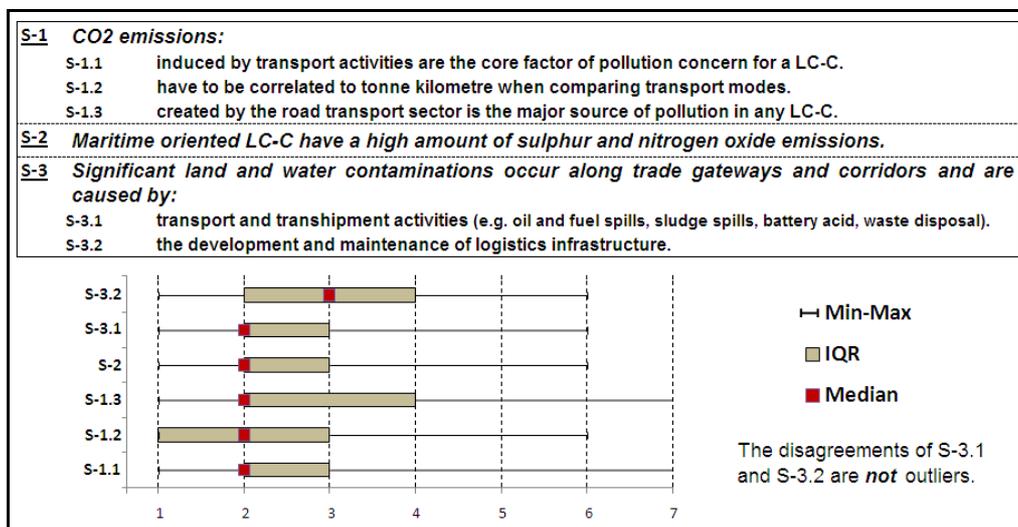


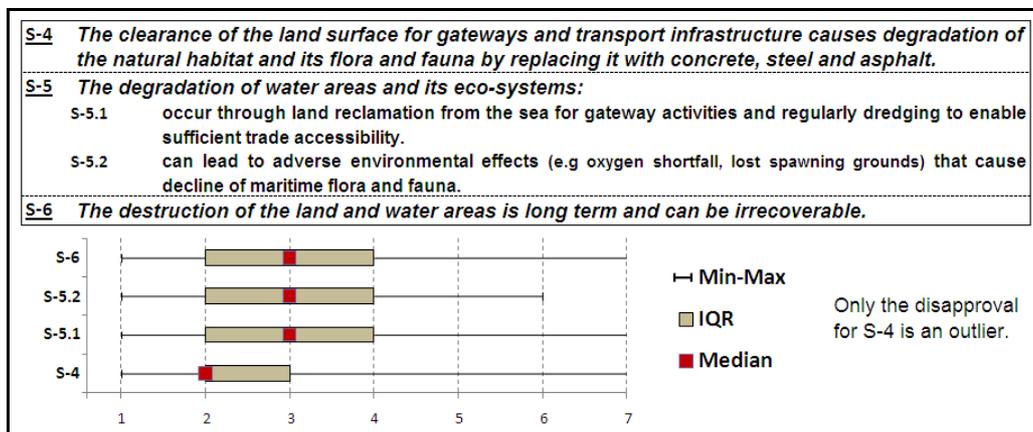
Figure 9.3-64: Results – The impact of pollution

The findings in regards to emissions are all ‘approved’. First, the massive transport activities within Logistics City-Clusters causing an above average CO<sub>2</sub> emission (S-1.1). Second, to identify the transport mode contribution to the emission, a tonne kilometre correlation is necessary (S-1.2). Third, road transport is the major CO<sub>2</sub> source (S-1.3) and fourth maritime oriented clusters have high level of sulphur and nitrogen oxide emission (S-2). Whilst the land and water contamination by transport and transshipment activities is ‘approved’ (S-3.1), the development of logistics infrastructure (S-3.2) is only ‘somewhat approved’. In regard to S-3.2, there is a difference within the sectors, since academic and industry participants have a more confirmative perception (median 3) then government (median 4). The following comment was given:

*Of course, everyone of the single measures have an effect on the land and water quality, however on different levels.*

Hence, the development of logistics infrastructure contaminates land and water on a lower level as the actual logistics operation.

The second core impact of land and water area degradation relates to the massive allotment for gateways and transport infrastructure, which destroys natural habitats. In this context, conclusions S-4 to S-6 were assessed (Figure 9.3-65).

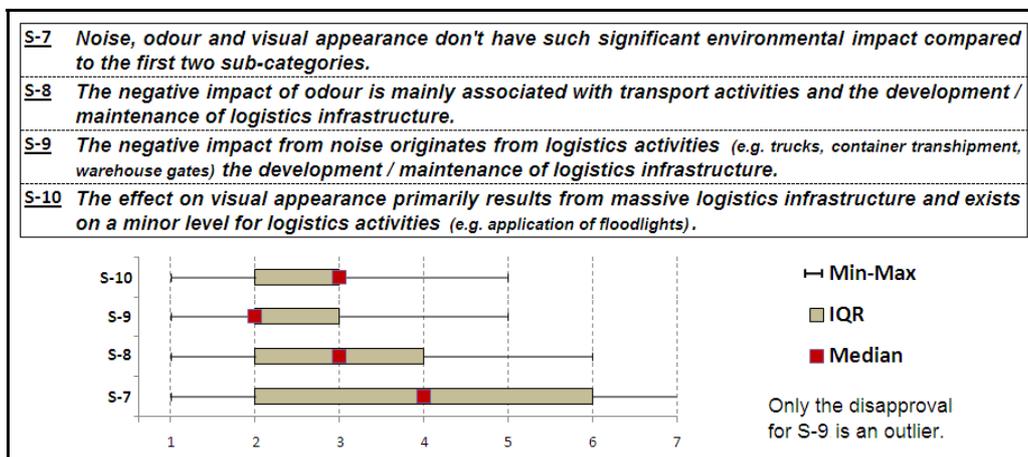


**Figure 9.3-65: Results – Environmental degradation due to land use**

The concern that the clearance of the land surface for logistics infrastructure causes degradation of the flora and fauna is ‘approved’ (S-4). However, there is some contestation regarding the degradation of water areas. First, it is ‘somewhat approved’ that land reclamation and regularly dredging causes degradation of maritime habitats (S-5.1). Whilst academia clusters around ‘approve’, government has a ‘neutral’ perception and industry ‘somewhat approves’. Secondly, the correlation that the possible environmental effects cause decline of maritime flora and fauna is ‘somewhat approved’ (S-5.2). Regarding the sectors, the government and industry ‘somewhat

approve’, whilst again the academic sector ‘approves’. Further there is a regional difference, since the Asia-Pacific region is more confirmative (median 2) than Europe (median 3). Similar results were observed when stating that the destructions are long term and can be irrecoverable (S-6: median 3). Consistent with the trend academia is ‘approving’, whilst government (median 3.5) and industry (median 4) are less confirmative. The perceptions of academia for all three statements might be explained by their objective stand, since there is no intimate involvement in the development or utilisation of the logistics infrastructure. Both the government and industry, on the other hand, are direct stakeholders; therefore less approval ratings providing a stronger base for actual development and utilisation. However, another reason might be that technology advanced and regulations are enforced that reduced these negative impacts, as discussed later. Consequently, reasonable degradation of maritime ecosystems occurs due to dredging and reclamation of land. In this context, the destruction can be long term and irrecoverable, however less powerful than interpreted in Round II.

Regarding the third core impact it was concluded that odour is commonly associated with pollution effects and noise is primarily generated by logistics operations. Instead, the negative impact on visual appearance largely results from massive logistics infrastructure. This interpretation was presented by the statements S-7 to S-10 for validation (Figure 9.3-66).



**Figure 9.3-66: Results – Effects of noise, odour and visual appearance**

S-7 is strongly contested, having considerable differences in the sectors and regions. Academia ‘somewhat approves’, whilst industry has a ‘neutral’ perception and government ‘somewhat disapproves’. Negative effects through noise, odour and impinging visual appearance is stronger felt in Europe (median 5) than in the Asia-Pacific region (median 3). Certainly, this result confirms that noise, odour and visual appearance have a substantial environmental effect, however not as strong as pollution

and land destruction effects, since it is not ‘disagreed’. Although their negative impact is confirmed, their associated sources are slightly contested. First, the sources of odour are ‘somewhat approved’ (S-8). When reviewing the data, there was no considerable divergence for the sectors or regions. Secondly, a similar level of contestation was observed when looking at the source of impinging visual appearance (S-10 median 3). Only differences in the sectors emerged since the governments have a ‘neutral’ perspective, whereas academia (median 2.5) and industry (median 2) are more confirmative. Third, logistics activities and the development of infrastructure as sources of noise are ‘approved’ (S-9). Indeed, these mostly ‘somewhat approval’ on the sources of odour, noise and visual impingement, align with the earlier findings that there is a lower impact and source level compared to the other two impact factors.

### 9.3.3.2.2 Rising awareness of negative environmental impact

In Round II it was concluded that the reductions of hazardous environmental effects are mitigated by regional economic and micro company factors. However, environmentally friendly behaviour is increasing through external and internal pressures and benefits. The notion of rising awareness was tested by statements S-11 to S-15 (Figure 9.3-67).

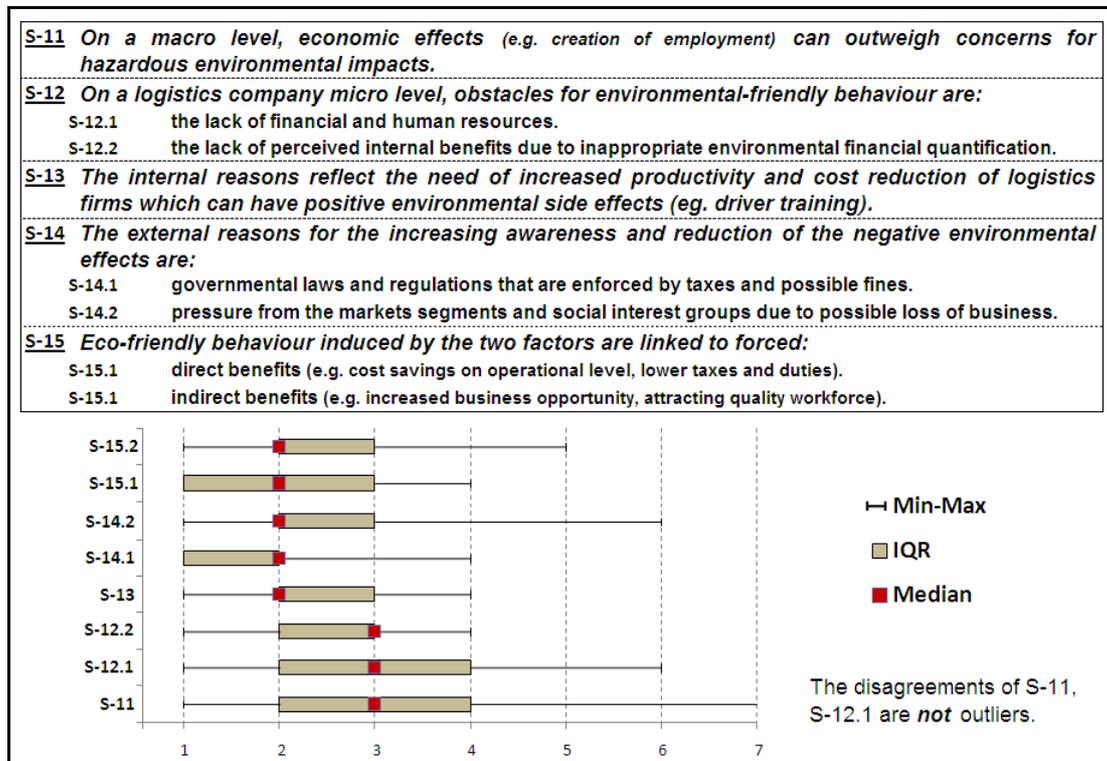


Figure 9.3-67: Results – Rising awareness of negative environmental impact

The statement that macro level economic effects can outweigh hazardous environmental concerns is contested (S-11: Median 3). There is a divergence in the sectors’ perspectives, since government responses cluster around ‘neutral’, whereas

academia and industry ‘somewhat approve’. Certainly the government perspective might be explained by the fact that this stakeholder group is responsible for regional development, suggesting a biased perception. However, it can also be that government planning balances environmental protection and economic growth, since the participating clusters are strong economic areas. It is concluded that macro economic objective effects can outweigh environmental impacts on a reasonable level. Also the micro level obstacles are contested, since the lack of company resource (S-12.1) and perceived internal benefits (S-12.2) are only ‘somewhat approved’. When disaggregating the data for both statements, there are no noteworthy regional differences and only a slight sectoral divergence for S-12.2. Both government and academic respondents ‘somewhat approve’, whilst industry is slightly more confirmative (median 2.5). Clearly, there is a common understanding that the identified micro causes can moderately encumber environmental concerns. Regarding the mitigating factors, it was stated:

*Sure there some internal factors that may hinder environmental-friendly behaviour. However, logistics need to bring themselves into the 21st century, as they are definitely not taking on the green message yet.*

Despite the conflicts between environmental and economic principles, it is ‘approved’ that the internal pressures of companies to increase productivity and reduce cost can have positive environmental side-effects (S-13). Further, the external reasons to reduce the negative impact (S-14.1 - 14.2) are ‘approved’. In this context it was further ‘approved’ that the forced eco-friendly behaviour can hold direct benefits (S-15.1) and indirect advantages (S-15.2).

### 9.3.3.2.3 Activities to reduce negative environmental impact

The increasing awareness towards environmental friendly behaviour resulted in two interdependent approaches to reduce negative effects. These two approaches were presented to the participants (S-1.1 and S-1.2), as visualised in Figure 9.3-68.

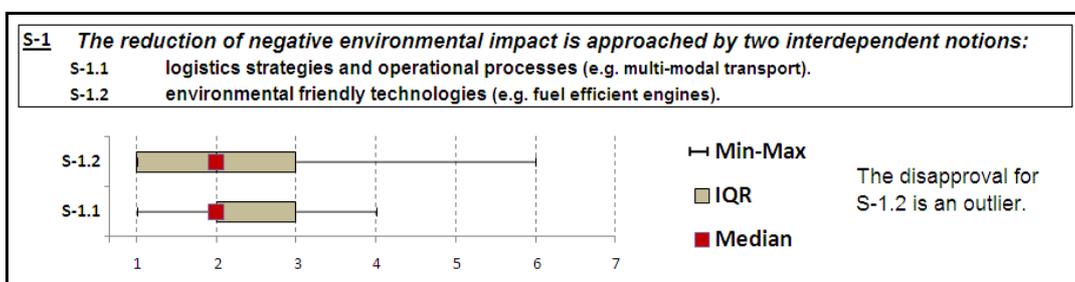


Figure 9.3-68: Results – Approaches reducing environmental degradation

It is ‘approved’ that logistics strategies / operational processes (S-1.1) and new technologies (S-1.2) are current approaches to reduce hazardous potential effects on

the environment. The following section analyses these two approaches on the three confirmed environmental impact categories.

### Current activities to reduce pollution

It was observed that there are macro and micro strategies to lower pollution. From a macro perspective multimodal transport can reduce the emission per tonne kilometre, but there are also regulations and higher safety standards which lessen possible contamination. At a micro company level, pollution can be reduced by cleaner technologies or efficient processes increasing utilisation. These interpretations were tested by statements S-2 to S-6 (Figure 9.3-69).

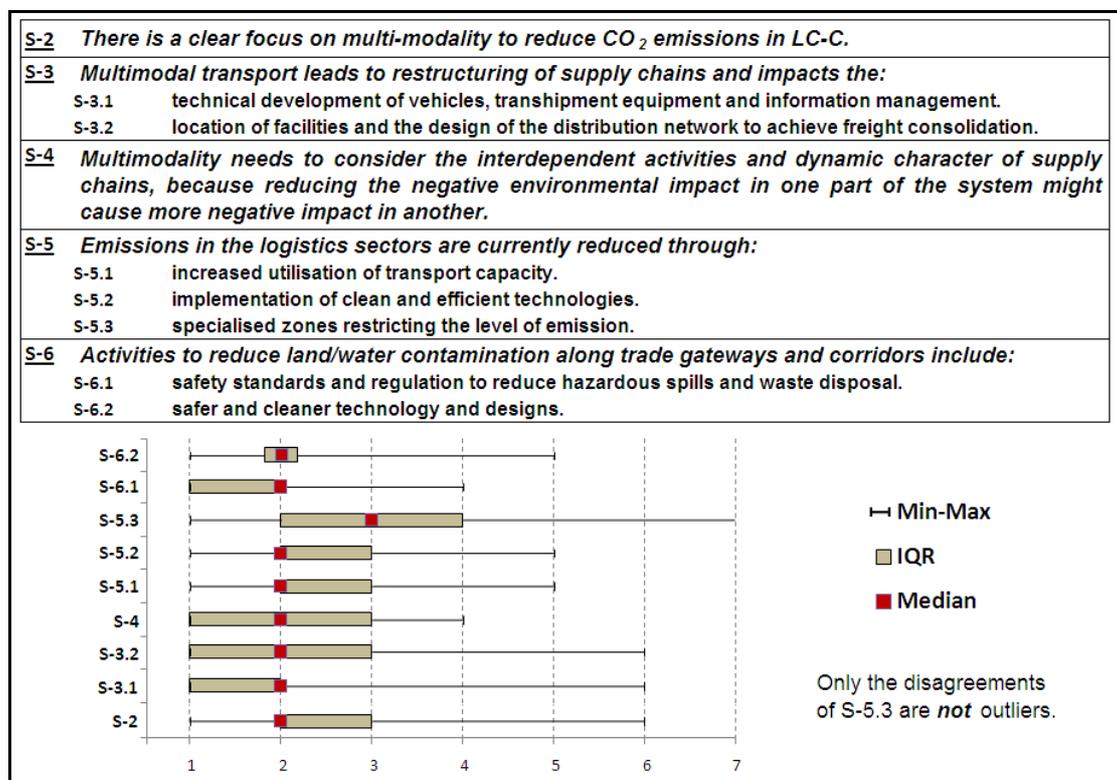


Figure 9.3-69: Results – Activities to reduce pollution

There is a clear ‘approval’ that current clusters focus on multimodality to reduce emissions (S-2). The listed elements of the necessary supply chain restructuring are confirmed. Hence, the impact on technical development (S-3.2) and on the distribution network design to achieve freight consolidation (S-3.1) is ‘approved. It was also confirmed that multimodality has to consider the interdependent activities as a system so that a lower negative environmental impact is achieved (S-4: median 2). Additionally, it is confirmed that emissions are also reduced due to increased utilisation of transport capacity (S-5.1) and the implementation of clean and efficient technologies such as catalytic converter (S-5.2). Specialised zones restricting the level of emission

(S-5.3) seem to be moderately applied since it is only ‘somewhat approved’. Examination of the data indicates a sectoral divergence. The academics and government ‘somewhat approve’, whereas industry clearly ‘approves’. The activities to reduce land and water contamination along trade gateways and corridors are confirmed. Based on the maximum rating and the skewness of responses it is concluded that higher safety standards and regulation (S-6.1) are currently more important, than safer and cleaner technology (S-6.2).

### Current activities to reduce land degradation

It was found that regulations and new technologies can reduce the degradation of land and water induced by infrastructure developments. This includes the minimisation of required areas and preventive actions reducing the destruction of natural habitats, which were assessed by statements S-7 and S-8 (Figure 9.3-70).

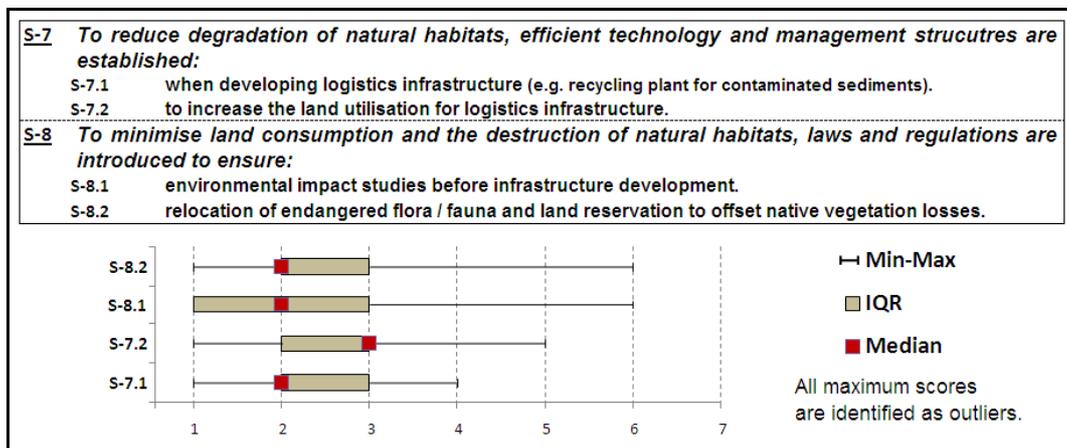
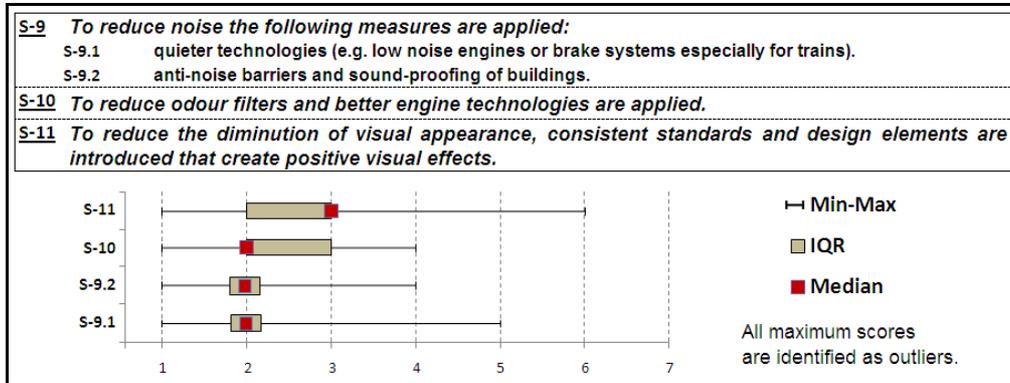


Figure 9.3-70: Results – Activities to reduce land degradation

The role of technology and management plans to reduce degradation of natural habitats when developing logistics infrastructure is ‘approved’ (S-7.1). There is, however, a contested outcome regarding increased land utilisation (S-7.2: median 3). When disaggregating the data only a regional difference is obvious. The participants from Asia-Pacific region confirm (median 2), whereas the European respondents ‘somewhat approve’. Hence, efficient technology and processes are moderately implemented to increase the land utilisation, having in mind that there is room for improvement. Whilst laws and regulations are introduced to minimise the destruction of natural habits, their specific purposes are weighted differently. Regulated environmental impact studies (S-8.1) seem currently in the focus, since relocation of endangered flora / fauna and land reservation to offset native vegetation losses (S-8.2) is negatively skewed.

### Current activities to reduce noise, odour and visual encumbrances

It was concluded that the reductions of noise, odour and impinging visual appearance can be ensured by the implementation of new technologies or designs. Consequently, three effects are tested (S-9 to S-11) as shown in Figure 9.3-71.



**Figure 9.3-71: Results – Activities to reduce noise, odour and visual effects**

The measures of technology (S-9.1) and anti-noise barriers (S-9.2) are ‘approved’. Additionally better engine technologies and filter systems are currently in the focus to reduce odour (S-10: median 2). However, the identified measures to reduce the negative visual effect of logistics infrastructure and operational functions are contested (S-11: median 3). There are differences in the regions and sectors. The Asia-Pacific region is more confirmative (median 2) then Europe (median 3). Further the academic and government sectors ‘somewhat approve’, whilst industry ‘approves’. Because, the government sector commonly is the driving force behind regulations involved, therefore it is credible to emphasise their perceptions. Further, it might be that industry sees this regulation from an economic perspective, not benefiting the performance measures. Perhaps, their approval is based on this perception. Consequently, the measures to reduce negative effects of visual appearance are reasonably implemented. However, there is potential for a stronger implementation, as indicated by following quote:

*Buffering ... of corridors and transshipment points tend to be underplayed in regards to visual appearance, but are very important.*

Certainly, spatial planning and its associated buffer zoning can also indirectly reduce negative effects of odour, noise and visual appearance. This useful tool, however, should be combined with long term solutions, as introduced, that tackles the actual causes instead of just separating the source and the affected communities.

#### 9.3.3.2.4 General notion of the environmental impact category

After testing the detailed elements of the environmental impact category, the participants were asked to either confirm or reject its structure and understanding. Figure 9.3-72 illustrates the result obtained from the analysis.

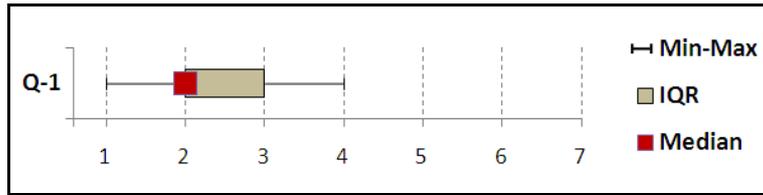


Figure 9.3-72: Results – The environmental impact category

The result indicates a clear ‘approval’ of the generic environmental impact category, without any disagreement. Hence, this category is a very robust part of the wider Logistics City-Cluster framework.

### 9.3.3.3 Analysis of the social impact

Social impact has been concluded in Round II as those effects that are experienced at a personal, family or community level. It includes influences from the economic and environmental effects on the social system due to the interdependent character of sustainability. The effects are segmented in three categories: (i) *the liveability factor*, (ii) *material wellbeing and work related impacts* and (iii) *the interconnectedness of the community*.

#### 9.3.3.3.1 Effects on the liveability factors

The liveability factor details the quality of the environment. In this context it was concluded that the environmental hazardous induced by logistics activities reduce the quality of life. The identified major elements (e.g. pollution) are taken into consideration and tested by statements S-1 and S-2 (Figure 9.3-73).

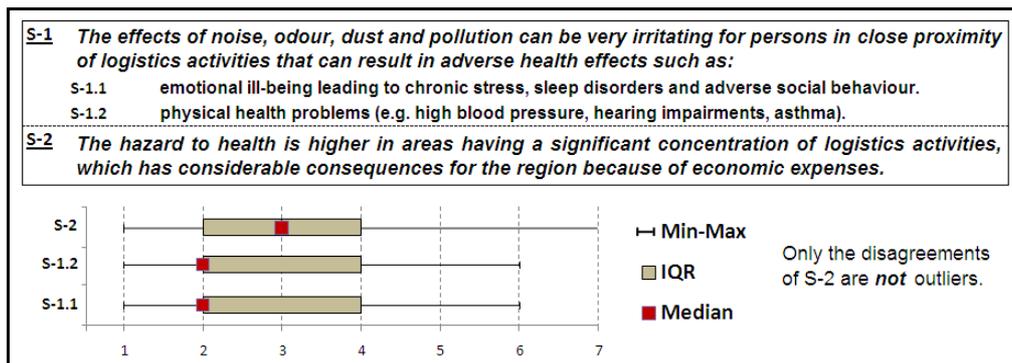


Figure 9.3-73: Results – Environmental hazards and its effect on liveability

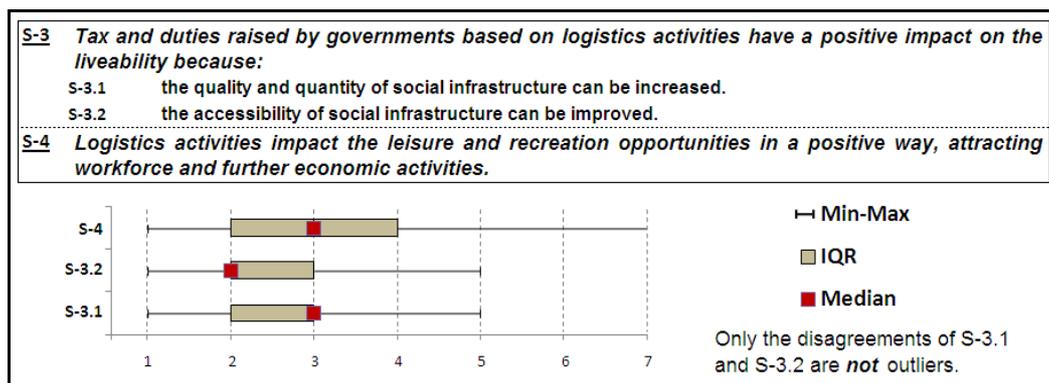
It is ‘approved’ that logistics induced hazards can have a negative effect on the liveability factor since it causes emotional ill-being (S-1.1) and physical health problems (S-1.2). However, a controversial subject is the contestation of the statement that the health hazard is higher in areas having a significant concentration of logistics activities, which has considerable economic consequences for the region (S-2: median 3). There

are appreciable divergences within the regions and the sectors. First, the government perception is 'neutral', academia retains a median of 2.5 and industry has a median of 3.5. Secondly, it is less confirmed in Europe (median 4) then in the Asia-Pacific region (median 3). As confirmed earlier logistics has a negative environmental impact and contribute to the diminishing quality of life. But it seems that logistics is not the only factor in a metropolitan setting, and other elements need to be considered, as commented by one participant:

*Well there are branches of industry in the area that have an even greater negative environmental impact. For example, the chemical or the metal industry. (Tr.)*

Hence, it is concluded that there are reasonable regional consequences due to economic expenses, but logistics is not the only impacting factor.

Secondly, the liveability factor reflects the role logistics agglomeration holds in the community. The core notions in this regard are the governmental revenue streams which enable funding for social infrastructure and leisure opportunities. This understanding was tested by statements S-3 to S-4, as presented in Figure 9.3-74.

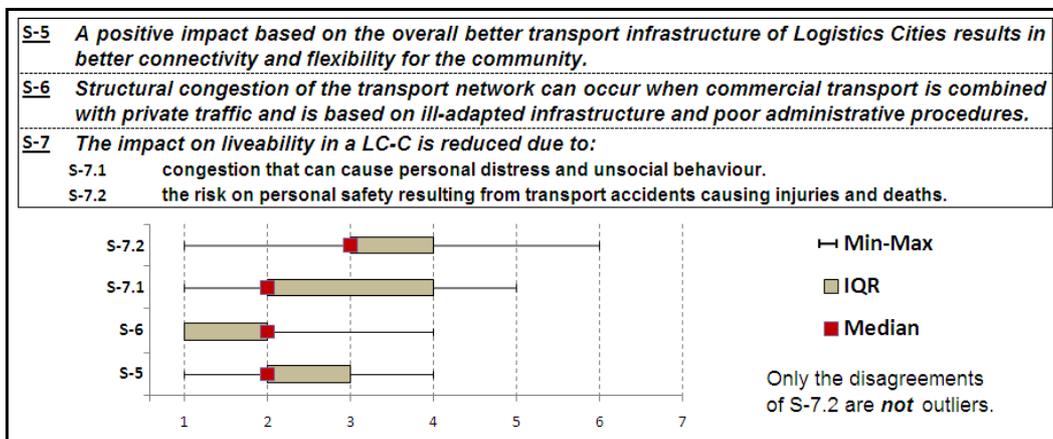


**Figure 9.3-74: Results – Social infrastructure and its effect on liveability**

It is 'approved' that the accessibility of social infrastructure can be improved based on the revenue raised by governments from the logistics industry (S-3.2). However, the quality and quantity improvement of social infrastructure (S-3.1) due to the revenues is only 'somewhat approved'. There is only a small regional difference, since the Asia-Pacific region 'somewhat approved', whilst the European participants 'approved' (negatively skewed). Hence, it is concluded that the tax and duties raised by governments have a moderate positive impact on the liveability factor. This might result from the earlier confirmation that not all revenue is dedicated towards the cluster and that endowment of regions with capital for infrastructure developments is challenged. The finding that logistics activities impact the leisure and recreation opportunities in a positive way is contested (S-4: median 3). There is an obvious regional and a minor sectoral divergence, with government and industry participant 'somewhat approve'.

Interestingly academia is represented by a median of 3.5. Further, the Asia-Pacific region (median 3) is more confirmative than the European participants (median 4: positively skewed). These contradictory results are not unexpected, since it reflects the earlier contested results regarding the strong linkage of social infrastructure towards the core trade gateway and the sophistication of core activities. Hence, it is concluded that there is a reasonable impact on liveability, however not as strong as interpreted in Round II.

The final notion in regards to liveability is associated with the adequacy of commercial transport infrastructure that brings connectivity advantages for local private users but also can reduce the liveability due to high density traffic. Three core conclusions were tested (S-6 to S-7), and Figure 9.3-75 represents the outcome.

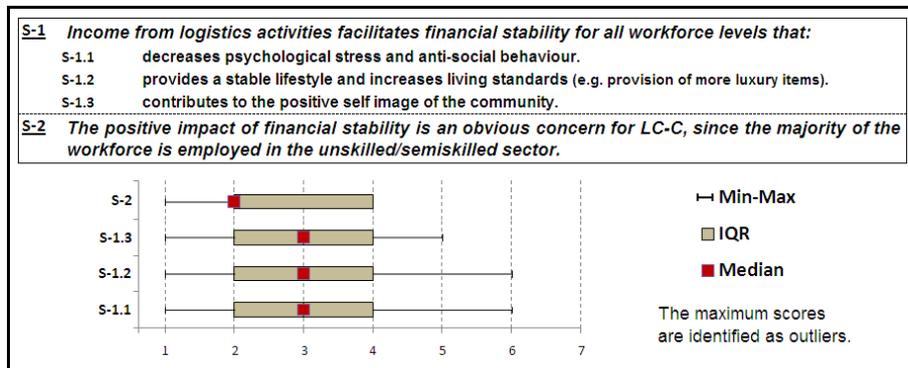


**Figure 9.3-75: Results – Transport infrastructure and its effect on liveability**

It is 'approved' that the overall better transport infrastructure of Logistics City-Clusters results in better connectivity and flexibility for the community (S-5). But, as 'approved' structural congestion can occur when commercial transport is combined with private urban travel as well as when ill-adapted infrastructure and inappropriate poor administrative procedures are in place (S-6). This structural congestion reduces the liveability factor by causing personal distress (S-7.1: median 2). However, the earlier interpretation that liveability is reduced due to the risk on personal safety resulting from transport accidents is contested (S-7.2: Median 3). There is only an appreciable divergence for the sectors. Both government and academia 'somewhat approve', whereas industry has a 'neutral' perception. Nevertheless, it should be considered that the industry sector is the indirect source for possible accidents and that government have enforced suitable regulations that reduce the chances of accidents. Consequently, while high commercial transport intensity represents a moderate threat for accidents, it is not seen as a very strong factor inhibiting liveability.

### 9.3.3.3.2 Material well-being and work related impact

Based on Round II, this sub-element of the social impact category reflects the effects of income for the workforce from logistics activities. The identified positive impact on the people, especially for unskilled/semiskilled workforce, was tested by statements S-1 and S-2 (Figure 9.3-76).



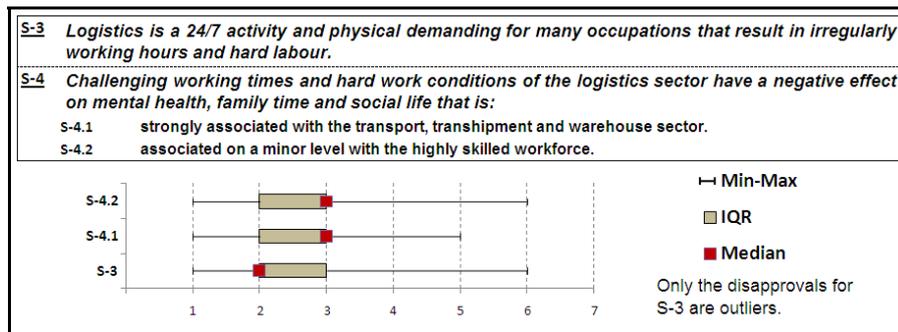
**Figure 9.3-76: Results – Income and its effect on material well-being**

Surprisingly the positive impacts resulting from the financial stability are contested (S-1.1 to S-1.3). It appeared that there are divergences in the sectors and regions for all statements. The difference regarding stress / anti-social behaviour (S-1.1) and the stable life / increases of living standards (S-1.2) are very similar. First, the government has a ‘neutral’ perception, whereas academia and industry ‘somewhat approve’. Second, Europe is represented by a median of 4 and Asia-Pacific region ‘somewhat approves’. The disaggregated results regarding the positive self image of the community (S-1.3) indicate the same trend, however is slightly more confirmative. The government together with academia ‘somewhat approve’, whilst industry ‘approves’. Also the Asia-Pacific region presents a more affirmative perspective (median 2.5) than Europe (median 3). It was stated:

*Impacts on lifestyle and crime are hard to justify and can be quite speculative.*

Based on the outcome and the representative comment, it is concluded that the listed positive effects occur on a reasonable level. Despite these contested notions, it is ‘approved’ that financial stability has a positive effect on the cluster, since the majority of the workforce is employed in the unskilled/semiskilled sector (S-2).

This sub-element of the social impact category also reflects the associated working conditions. The conclusions S-4 and S-5 will test the findings regarding the impact on the people that are employed in the logistics sector (Figure 9.3-77).

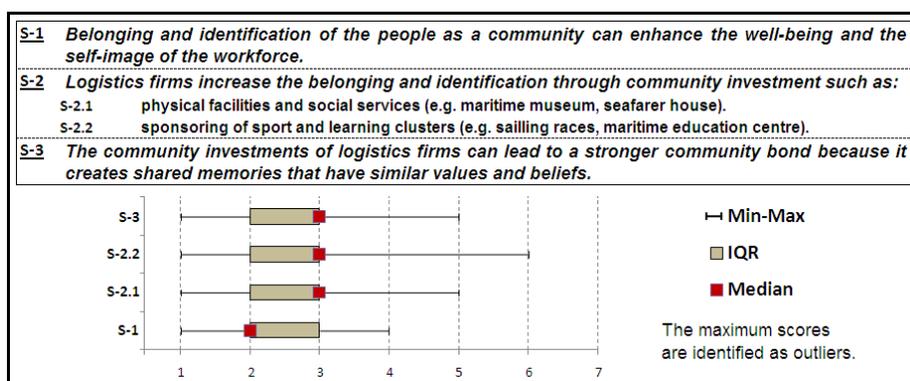


**Figure 9.3-77: Results – Working conditions and its effect on well-being**

It is confirmed that irregular working hours and hard labour are associated with the logistics industry (S-3: median 2). However, it must be noted that these depend on the actual occupation. Interestingly, the impacts of possible challenging work conditions are contested (S-4.1 and S-4.2: median 3). There are sectoral divergences for both statements. However, there is only a considerable regional difference for S-4.1, since Europe only ‘somewhat approves’ and the Asia-Pacific region ‘approves’. Academia ‘approves’ that the hard working conditions impact strongly on the unskilled/semiskilled sector (S-4.1), whilst industry and government ‘somewhat approves’ this notion. Regarding the minor impact for the highly skilled workforce (S-4.2), industry clearly ‘approves’, whilst academia ‘somewhat approves’ and government has a ‘neutral’ perception. Indeed, these results correlate to the contestation regarding hard working conditions. Hence, it is concluded that there is a reasonable impact on both the un-/semiskilled and highly skilled sector affecting their well-being. Unquestionably, this negative impact will be felt differently based on the nature of the logistics activity.

### 9.3.3.3.3 Interconnectedness of the community

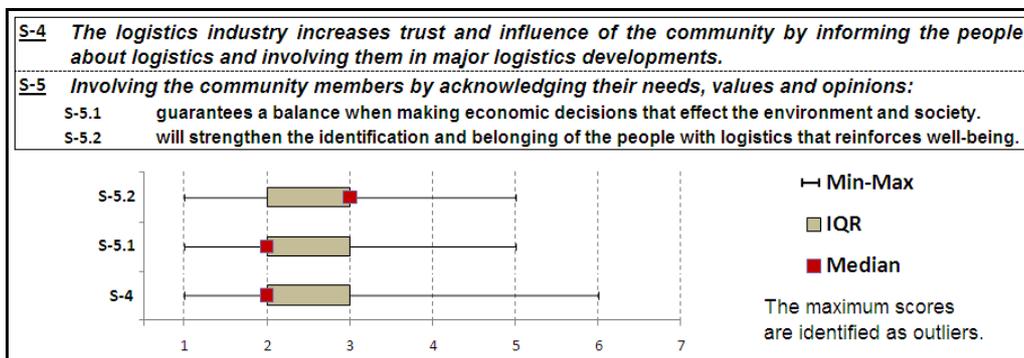
The notion of interconnectedness of the community contemplates the cultural effects induced by a Logistics City-Cluster. In this context, belonging and identification within the community is an important element for well-being. This understanding, correlated with the logistics sector, was presented by statement S-1 to S.3 (Figure 9.3-78).



**Figure 9.3-78: Results – Local community belonging and identification**

The respondents 'approved' the correlation of belonging and identification as a community towards the increased well-being (S-1). However, surprisingly, both results regarding the community investments of logistics firms to increase the belonging and identification are contested. Community investments such as social services and physical facilities (S-2.1) as well as sponsoring of sport and learning clusters (S-2.2) are only 'somewhat approved'. For both statements the regional and sectoral divergences are very similar. The academic and government participants 'somewhat approve' both, whilst industry is represented by a median of 2.5. These minor contradictory results might be explained by the fact that industry is the actual sponsor and clearly see their contribution in a better light, based on a constructivist perspective of this study. Further, analysis shows that both statements are 'somewhat approved' in Europe, whilst the Asia-Pacific region ratings for S-2.1 (median of 2.5) and S-2.2 (median 2) are more confirmative. Consequently, support by the industry exists, but there might be room for improvement. Interestingly, the general concern that community investments of logistics firms can lead to a stronger community bond is contested (S-3: median 3). Only a minor regional difference is observed. The Asia-Pacific region is clusters around the median of 2.5, whereas the European participants 'somewhat approve'. It seems that this result aligns to the earlier contested outcomes. Hence, it is concluded that community investments of the logistics firms can enable stronger community bonds.

It was also found in Round II that trust and influence is an important element for the interconnectedness of the community. In this context, statements S-4 and S-5 reflect the possibilities of the community having trust and partial involvement with logistics activities and its impacts (Figure 9.3-79).



**Figure 9.3-79: Results – Trust and influence of the community**

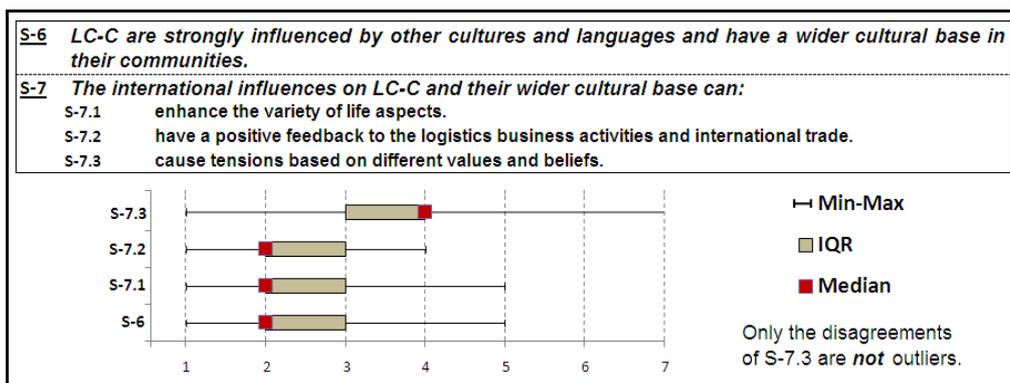
It is 'approved' that the logistics industry increases trust and influence by informing the community about logistics in general and involve the community in major logistics developments (S-4). In this regard it is 'approved' that involving the community

members by acknowledging their needs and opinions, guarantees a balance when making logistics-based economic decisions that affect the community (S-5.1). However, the understanding that involving the community members by acknowledging their needs and values will strengthen the identification and belonging of the people with the logistics sector is contested (S-5.2). It was found that there are obvious differences in the sectors and minor regional divergences. First the participants from Asia-Pacific region have a more confirmative tendency (median 2.5) then Europe (median 3). Secondly, the academics and industry participants ‘somewhat approve’, whereas the government ‘approves’. Indeed, this outcome reflects the earlier contested notion of belonging and identification as a community induced by the logistics sector. One government participant stated:

*A community's health and well being need to be considered by the logistics industry and government. It is partly done today however there is still a lot to do.*

It is concluded that the consideration of the community values by the logistics industry will reasonably strengthen the identification and belonging of the people with the regional economic driver. Indeed, the current situation is not optimal; however it is a beginning and provides a base for further improvements.

The final notion in regards to interconnectedness of the community is associated with the global connectivity and logistics’ international character. The identified influential effects of different cultures on the Logistics City-Cluster were tested by statements S-6 and S-7 (Figure 9.3-80).



**Figure 9.3-80: Results – Increased international character**

It is ‘approved’ that Logistics City-Clusters are strongly influenced by other cultures and languages (S-6). Further it is confirmed that the international influences and the wider cultural base can enhance the variety of life aspects (S-7.1: median 2) and can have a positive feedback to international trade and logistics industry (S-7.2: median 2). However, it appeared that the notion of possible tensions based on different cultural values and beliefs is strongly contested (S-7.3). When disaggregating the data,

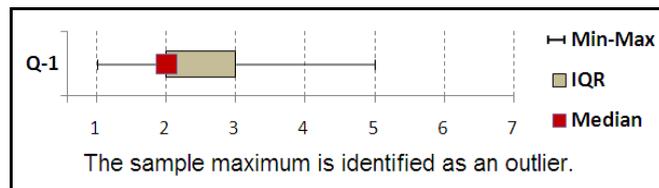
differences for the sectors occurred. Whereas academia ‘somewhat approved’, the government and industry have a ‘neutral’ perception. There is also a minor regional divergence, since the Asia-Pacific participants (median 3.5) are more confirmative than the European (median 4). The reason for this strong contestation might be explained by following comment:

*Well, the integration of other cultures is always a delicate political matter. People don't like to talk about this. But everybody knows that there are always challenges associated with this notion. (Tr.)*

Indeed, this notion should not be omitted, since Logistics City-Clusters inherit a multi-cultural base that can lead to possible challenges. However, due to the nature of the question it is suggested that it needs to be looked at in more detail in a separate investigation.

#### 9.3.3.3.4 General notion of the social impact category

After testing the detailed elements of this category, the participants were asked if they agree with the way in which the determinants of the social impact category have been drawn together. Figure 9.3-81 below illustrates the result of the analysis.



**Figure 9.3-81: Results – The social impact category**

The result indicates a clear ‘approval’ of the generic social impact category. However, it must be emphasised that various detailed properties of this category were contested, although there were surprisingly only few disagreements. Indeed, this confirms that the social segment of sustainability is not a mature element and, as is common with subjective issues, their characters are hard to grasp. The following representative comment from this final iteration indicates this challenge:

*The social aspect is a difficult element and sometimes is out of my comfort zone. ... I have used 'neutral' mainly when I do not know the answer to the statement. ... Sometimes it seems there is some truism and sometimes the logic is good.*

Hence, the constructivist nature of this research is especially evident in this category of the model. As a final conclusion it can be noted that the social impact category in its generic understand is a robust part of the wider framework.

## 9.4 Concluding Delphi Round III

The Round III validation confirmed the definitional understanding and more importantly there was a strong agreement without any disapproval on the holistic Logistics City-Cluster framework. This was given further confidence by the individual confirmation of the three core categories.

First, the generic structure and use of the enabler category is agreed upon. This was further strengthened by the individual approval of the holistic understanding for each enabling category. Whilst this macro structure of the enabling elements is fully validated and established, there were some contestations for the enablers' properties, the micro level. Overall 150 properties were tested, of which 123 were confirmed and 27 contested, whilst none were disagreed on (Table 9.4-1). This resulted in a wider confirmation rate of 100%, whilst considering the contestation the approval rate is 82%.

**Table 9.4-1 Confirmation and contestation of the enabler properties**

Enabler Category	Raking of the 'Enabler' Properties			Total Properties
	Strong Confirmation	Minor Contestation	Disagreement	
Market Enabler	12	1	0	13
Infrastructure Enabler	18	4	0	22
Service Enabler	17	1	0	18
Workforce Enabler	13	6	0	19
Knowledge Enabler	14	5	0	19
Capital Enabler	11	2	0	13
Competition Enabler	22	4	0	26
Governance Enabler	16	4	0	20
	<b>123</b>	<b>27</b>	<b>0</b>	<b>150</b>

Based on the analysis of the minor contestations, only a few amendments and further insights for the framework were considered necessary. However, not all minor contestation have resulted in changes, based on the disaggregation and reasoning of the data. The amendments are summarized below.

Market Base Enabler:

**I. evaluation of the market segment strength**

The indicator of total employment is not as critical as the GDP measures and the number of leading companies, but should be applied in combination with the two core indicators.

Infrastructure Enabler:

**I. drivers that force innovations to increase logistics infrastructure capacity**

Whilst high trade growth is a major force, it was concluded that land scarcity and long infrastructure implementation times are seen only as moderate drivers.

**II. linkage of social infrastructure towards gateways and sophistication of core activities**

The relationship between social infrastructure and the clusters core gateway / activities is not as strong as derived in Round II, but significant enough to be included in the framework.

#### Service Enabler:

**I. competition between supporting and logistics activities regarding other enablers**  
This property remains part of the framework, having further insight that the level of competition varies between particular activities and needs to be defined on a micro level.

#### Workforce Enabler:

**I. education of the highly skilled workforce**  
Required education of the highly skilled workforce is now defined as long term and costly, which does not necessarily include tertiary education.

**II. scarcity of un-/semiskilled workforce**  
Hard labour, low career and income prospects contribute to labour scarcity to some extent, but are not as significant as found in Round II.

**III. scarcity of highly skilled workforce**  
The main reason for scarcity is associated with the low reputation of the logistics sector, whereas inappropriate tertiary education and social infrastructure only have a moderate effect.

**IV. educated workforce from distant areas is likely to leave in better economic times**  
There is only a moderate threat of losing non-local educated workforce, which appears on a lower level in Europe than in the Asia-Pacific region.

#### Knowledge Enabler:

**I. innovation benefits introduced by a single company disperse along the supply chain**  
Innovation benefits are moderately dispersed along the supply chain, having in mind that it depends on the area and the dispersive character of the innovation itself.

**II. global logistics operators develop their own research departments**  
Whilst this trend is moderately evident, it is not as strong as interpreted in Round II, which leaves space for future innovation initiatives within the logistics companies.

**III. provision of direct industry research grants to logistics operators by governments**  
Direct financial support for the industry exists only on a moderate level. Instead, authorities focus their support directly on research platforms and its collaboration with the logistics sector.

**IV. collaboration between research centres and the logistics industry is not satisfactory**  
Collaboration in Europe is appropriate, whilst in the Asia-Pacific region it is developed moderately. Importantly, academia need to preserve objectivity that is not driven by business factors.

#### Capital Enabler:

**I. implications due to private capital involvement in infrastructure developments**  
The discussed negative and positive implications are valid. However, government and industry need to consider the implications holistically, instead of drawing attention to individual benefits.

#### Competition Enabler:

**I. intra-gateway competition is not always achievable, leading to high prices and low quality**  
It is concluded that low intra-gateway competition has a negative effect on prices and quality, which however only appears when inter-gateway competition is not sufficient.

**II. major customers of transshipment activities own trade nodes to reduce overdependence**  
Only in some occasions when customers have an appropriate market mass to justify large investments, they operate gateways to reduce negative effects of monopolistic structures.

#### Governance Enabler:

**I. a central decision-making and implementation governance body is presumptuous**  
It is concluded that a central decision making body is not perfect. However, it might be that in some clusters a more central governance body is favourable, based on the political background.

Second, the generic structure and use of the influence category is confirmed, without any disagreement. Consequently, the effects of governments and the influence of

geography, which shape the development of a Logistics City-Cluster, are critical elements of the holistic framework. The validation of this macro structure was further supported by the individual agreement of both categories. Indeed, the geographical category is one of the strongest aspects, since all 17 micro-properties were approved and therefore no amendments are necessary. The political influence category was tested on a micro level by 52 statements, having 34 confirmations, 18 contestations and no disagreements. This results in a wider confirmation rate of 100% and a contestation-approval rate of 65% (Table 9.4-2).

**Table 9.4-2 Confirmation and contestation of the influence properties**

Influence Category		Ranking of the 'Influence' Properties			
		Strong Confirmation	Minor Contestation	Disagreement	Total Properties
<b>Politics</b>	Market Enabler	4	1	0	5
	Infrastructure Enabler	5	1	0	6
	Service Enabler	4	3	0	7
	Workforce Enabler	4	4	0	8
	Knowledge Enabler	6	1	0	7
	Capital Enabler	2	4	0	6
	Competition Enabler	4	3	0	7
	Governance Enabler	2	1	0	3
	General	3	0	0	3
		<b>34</b>	<b>18</b>	<b>0</b>	<b>52</b>
<b>Geography</b>	Market Accessibility	11	0	0	11
	Functional Enabler	3	0	0	3
	Past Depended Factor	3	0	0	3
		<b>17</b>	<b>0</b>	<b>0</b>	<b>17</b>

It needs to be reinforced that the statements of the political influence category were presented in a way to identify tools and strategies that are currently applied by governments. Indeed, since no property was disagreed on, all identified tools and strategies from Round II are utilised. However, the contestations implied that some are only applied on a moderate level, as summarized:

Influence on the Market Enabler:

**I. integrate high quality markets**  
Government regulations that have a direct effect on the market quality and enable access to standardised quality information about logistics services are only moderately applied.

Influence on the Infrastructure Enabler:

**I. driver for a successful implementation of an integrated information platform**  
The support by authorities for the development of integrated information platforms is limited, since this virtual infrastructure component is not part of the classical influential areas of governments.

Influence on the Service Enabler:

**I. attraction and integration of economic activities**  
The provision of direct subsidies is not strongly supported and only applied when critical, since exaggerated subsidies without pertinent reasoning can create a climate of dependency.

**II. governments co-ownership of logistics activities**

Government co-ownership to support start-ups and new technology is only moderately evident, which results from the lower innovation intensity of the logistics sector.

**III. efficient operation of government owned services**

Government regulated and operated activities are currently handled at a moderate efficiency level and their competence has to be increased to avoid compromising the cluster as a system.

## Influence on the Workforce Enabler:

**I. ensuring the development of educated workforce**

Industry participation in education lowers the necessity of government involvement in these areas:

- support for state-of-the-art logistics education centres and ensure excellent educators
- regular update of educational curriculum
- tax deductions for private educational activities

However, governments strongly intervene when skilled and motivated workforce is scarce.

**II. government support when skilled workforce is scarce**

Marketing campaigns to attract potential employees are not directly initiated by the government, but rather driven in collaboration with industry and education providers.

## Influence on the Knowledge Enabler:

**I. stimulate innovation and its implementation within the logistics sector**

It is concluded that direct financial support exists on a moderate level, whilst governments strongly focus their support on collaborative activities and dedicated research centres.

## Influence on the Capital Enabler:

**I. private involvement in infrastructure financing has not diminished governments influence**

Whilst governments have a leading role in PPP arrangements, their influence towards user-pays systems and consequent generated funds is restrained.

**II. influence on the availability of capital for the logistics operators**

The influence on capital availability through direct interest rates, favourable regulations and attracting foreign capital appears only on a moderate level.

## Influence on the Competition Enabler:

**I. stimulation of competition in an environment that has sufficient and small demand**

The provision of exaggerated direct and indirect subsidies is not favoured, since it can create a climate of dependency and lower efficiency. It is only provided when critical.

**II. avoiding negative effects of monopolistic behaviour**

The enforcement of open access regulation is a dominant strategy to avoid negative effects of monopolies, whereas regulating and monitoring prices occurs only on a moderate level.

## Influence on the Governance Enabler:

**I. governments as a natural initiator for governance structures**

Government's influence on the establishment of a collaborative governance system is mainly linked to determined political will, rather than to its financial stimulation.

Third, impact effects on the surrounding region were approved without any disagreement. Hence, the macro understanding of the impact category and its segmentation into the economic, environmental and social dimension is an essential component of the framework. This conclusion is further encouraged by the individual validation of the three dimensions. Whilst there is no disapproval at the micro property level for any dimensions, resulting in a wider confirmation rate of 100%, there is significant divergence in their contestation-approval rate (Table 9.4-3). The economic dimension has the highest contestation-approval rate of 82%. In total 22 properties

were tested, from which 18 were confirmed and 4 were contested. The environmental dimension was tested on a micro level by 41 properties, having 28 confirmations and 13 contestations. This results in a contestation-approval rate of 68%. Although, there are only few negations by the participants for the 28 tested properties of the social dimension, there are 14 contested notions and only 14 clearly confirmed properties. Hence, this sub-category has the lowest contestation-approval rate of 50%.

**Table 9.4-3 Confirmation and contestation of the impact properties**

Impact Category		Raking of the 'Impact' Properties			
		Confirmed Properties	Contested Properties	Disagreement	Total Properties
<b>Economic</b>	Employment	6	0	0	6
	Value-Add	3	0	0	3
	Income Government	6	3	0	9
	Income Workforce	3	1	0	4
		<b>18</b>	<b>4</b>	<b>0</b>	<b>22</b>
<b>Environment</b>	Negative Effects	7	7	0	14
	Rising Awareness	5	3	0	8
	Reduction of Effects	16	3	0	19
		<b>28</b>	<b>13</b>	<b>0</b>	<b>41</b>
<b>Social</b>	Liveability Effects	6	4	0	10
	Material Well Being	2	5	0	7
	Interconnectedness	6	5	0	11
		<b>14</b>	<b>14</b>	<b>0</b>	<b>28</b>

Indeed, based on the contestation-approval rate it can be concluded that the economic dimension is the best understood and the most dominant factor. On the other hand the social segment appears to be an immature element that needs direct in-depth investigation. In general the earlier findings of Round II are strengthened and that for the development of a solid Logistics City-Cluster the environmental and social pillars have gained importance. Certainly, the environmental concern is of increasing importance since nearly all measures that reduce the hazardous impact of logistics activities are agreed upon. Nevertheless, due to the contestations new insight and few amendments for the framework were concluded, as specified below.

**Economic Impact:**

**I. taxes and duties generated by logistics activities**

All identified taxes and duties contribute as revenues to the government, however on a different magnitude. First, the value-add and income tax are more significant, than trade and payroll tax. Second, the duties generated from user-pay systems are less important than import/export duties.

**II. income level of the logistics industry compared to other service sectors**

It is concluded that the level of payment in the logistics sector, although being correlated to the education level, is modest when compared to other service industries.

**Environmental Impact:**

**I. land and water contamination along trade corridors and gateways**

Transport and transshipment activities cause a higher level of land and water contamination than the development and maintenance of logistics infrastructure.

<p><b>II. environmental degradation due to land use</b> Land reclamation and dredging are hazardous to the maritime eco-system, which can have long term effects. However, this is on a moderate level, since new technologies and regulations are being introduced.</p>
<p><b>III. economic factors out-weighting environmental concerns</b> Due to increased environmental friendly behaviour and regulations, macro and micro economic objectives outweigh environmental concerns only moderately, not strongly as indicated in Round II.</p>
<p><b>IV. reduction of emissions</b> Zones restricting the level of emission are not common. Instead, increased utilisation of transport capacity and the implementation of clean technologies are drivers to reduce emission.</p>
<p><b>V. reducing the degradation of natural habitats</b> Whilst the increase of land utilisation is moderately focused to reduce degradation of natural habitats, the environmental friendlier development of infrastructure is currently of more importance.</p>
<p><b>VI. reducing the diminution of visual appearance</b> Consistent standards and design elements to reduce visual impingement are reasonably implemented, whilst the governments' focus is on spatial planning and its associated buffer zoning.</p>

Social Impact:

<p><b>I. environmental hazards and its effect on liveability</b> Logistics has a negative environmental impact and therefore contributes to the notion of diminishing quality of life. But logistics is not the only impacting factor in a metropolitan setting and therefore has only reasonable regional consequences on health-induced economic expenses.</p>
<p><b>II. social infrastructure and its effect on liveability</b> There is only moderate positive impact on the quality/quantity enhancement of social infrastructure based on the tax and duties raised by governments. Whilst there is a reasonable impact on the leisure and recreation opportunities by logistics, it is not as strong as interpreted in Round II.</p>
<p><b>III. transport infrastructure and its effect on liveability</b> The high commercial transport intensity represents only a minor threat for accidents and therefore is not seen as a very important factor inhibiting liveability.</p>
<p><b>IV. income effects on well-being</b> The following positive impacts resulting from the financial stability only appear to be modest: - decrease of stress and anti-social behaviour - provision of a stable life and increase of living standards - creation of a positive self image of the community</p>
<p><b>V. social effects due to working conditions</b> Although logistics is associated with challenging working conditions, its negative effects on health and social life for both workforce segments are not as strong as interpreted in Round II.</p>
<p><b>VI. increase of belonging and identification through community investments</b> Logistics firms' community investments and their consideration of community values will only reasonably strengthen the regional bond and identification. In this context, community investments by the logistics industry exist only on a moderate level.</p>
<p><b>VII. effects of the international character of logistics</b> Possible challenges based on different cultural values and beliefs can occur, since Logistics City-Clusters inherit a multi-cultural base. However, due to the nature of the question it is suggested that it needs to be looked at in more detail in a separate investigation.</p>

Chapter 10 will address the three research questions that underpin to the holistic framework. This discussion subsequently includes implications for the future development of Logistics City-Clusters based on the enabling elements, influential factors and regional impacts. The Chapter further details the significance and practical application of the knowledge claims, the constraints of this study and finishes with a discussion on future research opportunities.

# Chapter 10

## Implications and further research opportunities

### 10.1 Introduction

The aim of this research was twofold. First was to make a contribution to the limited theoretical knowledge of the emerging Logistics City-Cluster concept as an integrated logistics platform. Thus, the focus was on identifying the enabling elements of a Logistics City-Cluster and its common characteristics, distinguishing attributes and unique value propositions. Second, was the exploration of the underlying assumption that the concept provides a positive strategy leading to sustainable regional growth. The core focus here was the identification of regional effects of Logistics City-Clusters in terms of the three pillars of sustainability. Consequently, this research intended to integrate this new body of knowledge into a Logistics City-Cluster framework to provide rich explanatory and descriptive expressiveness. The work correlates informed judgements spanning a wide range of disciplines and locations to achieve a holistic understanding of the elements of a Logistics City-Cluster and its regional effects.

This final chapter reflects on the research questions through the validated conceptual framework of Logistics City-Clusters. The first part, section 10.2, presents a consensual definitional understanding of Logistics City-Clusters, and addresses the first core research question of description and classification:

**1. How can the Logistics City-Cluster concept be defined as an integrated logistics platform and clearly distinguished from other existing logistics type structures?**

Section 10.3 assesses the holistic Logistics City-Cluster framework of three interdependent core categories with sub-section 10.3.1 focusing on the enabling and influential elements. It appraises the question of composition by breaking down the Logistics City-Cluster concept into its enabling components and consequently elaborates the more complex questions of relationships among influential variables and the enabling elements. Hence, this section addresses the second core research question and its associated sub-questions of composition and relationships:

**2. Which are the core determinants of Logistics City-Clusters and how are these influenced by external factors?**

How can the common enabling elements of the concept be described?

How do the enabling elements interact?

How do external factors influence these enabling elements?

Subsequently, implications for future Logistics City-Cluster developments are derived from the conclusions associated with these enabling elements and their influencing factors. Sub-section 10.3.2 considers the notion of sustainable regional impact of Logistics City-Clusters, reviewing the precise understandings of the third core research question and its sub-questions of causality:

**3. Does the Logistics City-Cluster, as a regional development strategy, provide a sustainable system?**

How might the concept impact on the economic aspect of the region?

How might the concept impact on the regional environment?

How might the concept impact on the social aspects of the region it serves?

Implications are then drawn for the most evident regional impacts of Logistics City-Clusters. This is followed by paragraph 10.4 that reflects the knowledge claims, the significance and practical application of this investigation. The Chapter ends with section 10.5 that discusses the limitations of this study and suggests directions for future research.

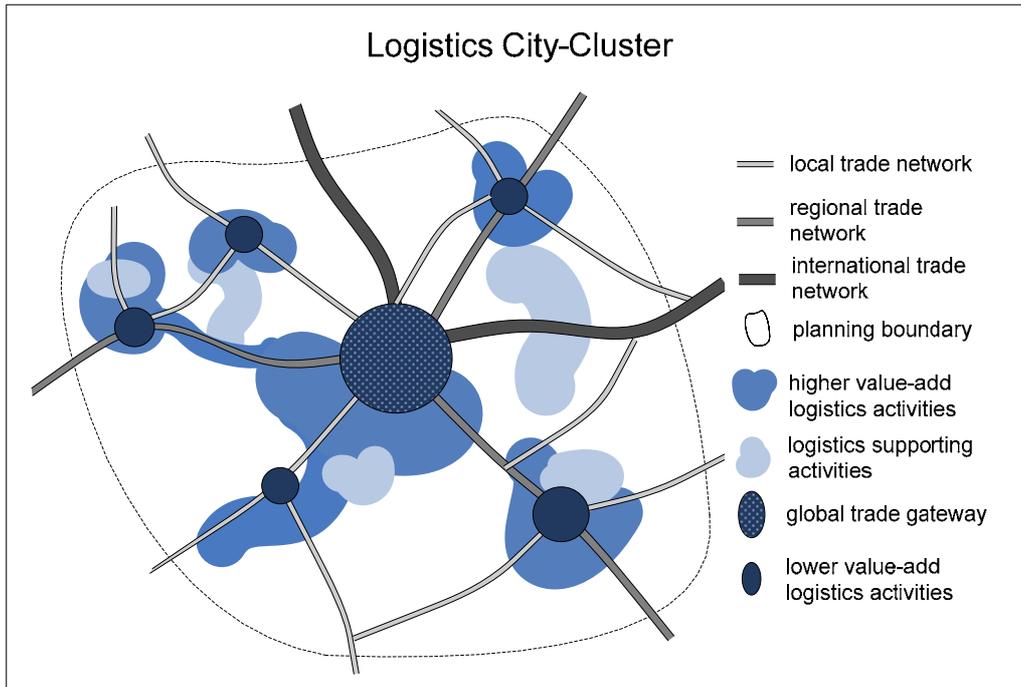
## **10.2 A precise understanding of Logistics City-Clusters**

A Logistics City-Cluster has been conceptualized as an integrated logistics platform that:

- (i) enables trade through gateways and their international, regional and local networks, covering goods inbound, outbound and in transit;
- (ii) efficiently combines lower and higher logistics value-add activities and integrates these supporting activities demanded by the logistics industry;
- (iii) consists of various interrelated stakeholders in a geographical area that have a shared competitive position;
- (iv) incorporates a large metropolitan area consisting of dispersed logistics density poles in various locations confined by governance and planning boundaries.

It is the combination of these four core attributes that distinguishes a Logistics City-Cluster from other existing logistics type structures. Indeed, without any higher logistics value-add activities and sufficient supporting activities, a trade node having a gateway cannot be designated as a Logistics City-Cluster. Further a metropolitan area consisting of various activity poles having no clear physical boundary is the core

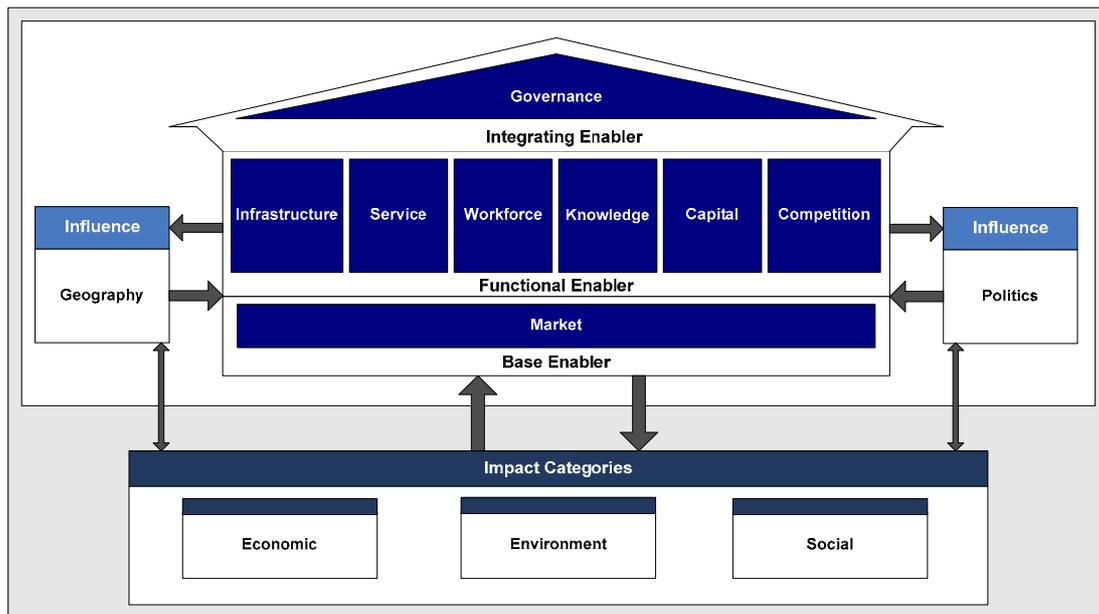
element for a Logistics City-Cluster, distinguishing it from smaller bounded logistics structures or from larger inter-regional cluster types. The collaborative arrangement of all stakeholders within a planning boundary is a critical element of a Logistics City-Cluster. It will increase its competitive advantage as a whole, due to the reduction of wasteful duplication and opposing activities without disturbing useful internal competition. Based on this consensual description, Figure 10.2-1 has been developed to visualise this somewhat complex configuration.



**Figure 10.2-1: Conceptual understanding of the Logistics City-Cluster**

### 10.3 The Logistics City-Cluster framework

The elaborated structure of the Logistics City-Cluster framework (Figure 10.3-1) has been synthesised from a review of existing cluster theories and the structured responses of key figures associated with world leading clusters located in Europe, the UAE and the Asia-Pacific region. First, the framework structures Logistics City-Clusters' enabling components and indicates their relationship with possible influencing factors. The eight enabling categories represent the core determinates of Logistics City-Clusters that provide both tangible and intangible capacity, and the means to management and development. The two influence categories represent external factors that affect these core determinants. Second, the framework also indicates the causality mechanism within Logistics City-Clusters foreshadowing the positive and negative effects of the three impact categories that occur within a region due to the presence of such a logistics-driven system.



**Figure 10.3-1: The Logistics City-Cluster framework**

Most importantly, the three core categories are interdependent. There is, for instance, an intimate relationship between the geographical influence factor that affects the enabling determinants of infrastructure and service, which will then shape the setup of other enablers such as education of the workforce or tailored capital. Indeed, enablers also have a reverse relationship to the influence category. Such as, the presence of a strong maritime trade gateway might affect governments to provide favourable regulation towards workforce education or research facilities associated with the maritime logistics sector. Additionally, there is an inverse correlation of the enabler category towards the geography factor, since new technologies or changes of logistics management strategies predefine the importance and influential character of geography. As an example, the size increase of ocean going vessels can diminish the original topographical advantage of Logistics City-Clusters that have river access to deep sea water. Consequently, to overcome the emergent geographical challenges induced by the service enablers, there is feedback to other enabler such as critical deployment of resources to upgrade and maintain infrastructure to allow modern deep sea vessels to access the seaport.

Furthermore, the impact category has a two-way interdependency with the enabler and the influence categories. In some cases, negative environmental effects can lead to direct changes in the logistics service enabler causing governments to enforce regulations influencing the enablers. Another example is that increase in employment, as an economic impact, might create a labour shortage hindering further growth. In this context, the government and industry stakeholder might initiate employment and

education strategies to address the issue of the workforce enabler. In addition, the revenue streams for governments due to tax and duties, based on logistics activities, provide authorities with much more influential power towards development of the enabler system.

Consequently, the identified core and sub-categories should not be seen as separate entities, but rather as a set of components that link as a holistic system. Changing one element will ultimately lead to obvious or subtle modifications in others. This understanding is critical in the facilitation and development of a sophisticated and competitive Logistics City-Cluster.

### **10.3.1 The enabler categories and influential factors - Implications**

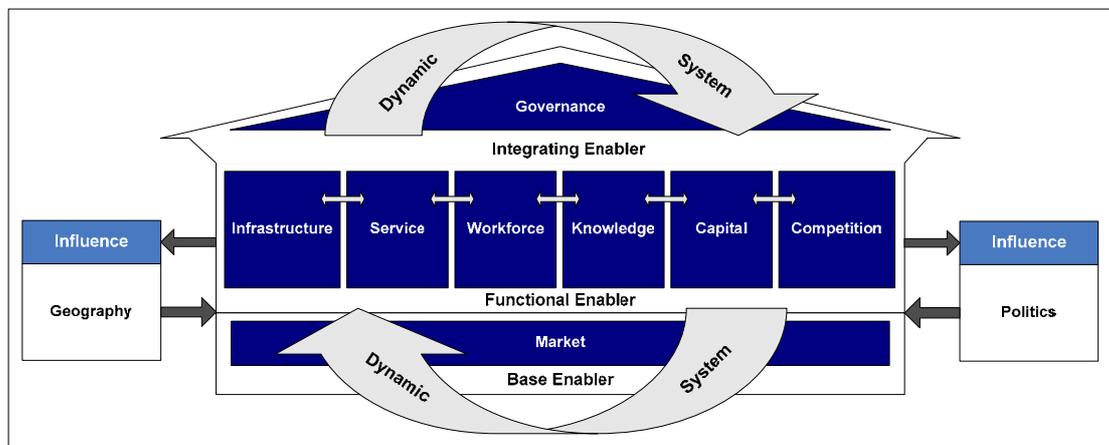
The enabling category, the centre of the framework, consists of eight subcategories which are graded into three main segments. First is the base enabler, consisting of the *'market' category*, which creates the demand to establish a logistics-driven system. Second are the six functional enablers (*infrastructure, service, workforce, knowledge, capital and competition*) that are the core elements of Logistics City-Clusters determined by the particular nature of the base enabler. Third, the integrating enabler of *governance* that has specially power to transform the Logistics City-Cluster into a holistic system by aligning objectives associated with the functional and base enablers. The critical core finding of the validated structure is that it is a complex system with a dynamic character resulting from the mutual interdependency of the enablers. Hence, if one enabler is altered in its properties and characteristics, it will change the course of other enablers. For instance, lack of skilled workforce will reduce the quality and efficiency of the services; low level of competition will decrease the level of innovation but also quality services. As a result of these relationships, the enablers have synergies, which, if strategically applied, have the potential to mold a mutual beneficial system.

For discussion of the influential elements, a twofold segmentation was found to be most convenient. First are the effects of *politics* on the development and conduct of the enablers. Indeed, government decisions can influence all enabling categories, both in positive and negative ways. To achieve positive impacts, support or influence should be made against a background of a clear strategic program that identifies long term goals. Favourable regulation and investments in educational institutions, grants that target applied knowledge creation and the development of quality infrastructure are

perceived to be more sustainable when compared with short term direct financial subsidies for economic activities. Consequently, governments need to ensure that its influence will stimulate innovation, higher productivity and efficiencies rather than creating a climate of dependency that leads to a long term loss of competitiveness. Important here is that the governmental long term strategies are clearly communicated to the public to avoid false short term expectation. Most critical is that political tools need to be aligned to the unique situation and environment in which a Logistics City-Cluster is embedded. The second factor influencing the enabler is *geography*, based on the notion of proximity and topography. Indeed, the more the topographical conditions facilitate economical mass connectivity to markets and the closer a location is to the gravity point of demand, the more likely is the emergence of a competitive Logistics City-Cluster. A clear implication of these observations is that unique geographical potentials must be recognized and interpreted positively to generate growth for the cluster and to increase its competitive advantage.

These two influential factors have dynamic interdependencies with the enablers, which can be obvious, subtle or reflexive. Although these two factors are the dominant influential drivers on the enablers, there are numerous other stimulatory elements such as pure inventions, technological discontinuities or various social and cultural factors.

Figure 10.3-2 visualises the structure of the enabling sub-categories, notes their dynamic character and suggests their interdependency with the two influential categories. The following sub-sections will comment on each validated enabling category separately and elaborate their complex relationships with the two influencing elements. These reflections are the basis from which the implications for the enabling categories are derived.



**Figure 10.3-2: The dynamic character of the enablers and influential factors**

### 10.3.1.1 The market base enabler

Clusters that are linked to various manufacturing and retail/wholesale market segments in dispersed locations have an advantage, since it reduces the reliance on single or few demand drivers. Local or regional markets are an excellent platform to stimulate logistics agglomeration forces, having the further potential to progressively accumulate market segments. However, a Logistics City-Cluster needs to be developed to serve as a global hub by connecting to a range of international markets. Whilst this will allow regional economic growth, it also increases the demand size for a cluster, which is essential for the efficient implementation and performance of the functional enablers. In this context, governments try to increase market size through favourable trade policies, import/export regulations and specialised trading zones. Further, authorities act as an early local demand source to stimulate establishment of new logistics strategies or technologies. Indeed, efficient accessibility to markets, favoured by topographical conditions and close proximity is beneficial, since it reduces logistics operational and infrastructure costs, decreases response time and increases reliability of services.

#### Market Implication I

Logistics City-Clusters need to buffer the dynamic character of demand by connecting to a wide range of markets on local, regional and international level, through:

- (i) aligning the functional enablers, especially infrastructure and logistics services, to different market location and commodity specification.
- (ii) introducing favourable trade policies and import/export regulations to enable international trade and consider specialised trade zones.
- (iii) recognising and building upon their unique geographical potential regarding market accessibility to derive benefits for the cluster.

Market forces determine the quality level of logistics services through their demand requirements. Hence, Logistics City-Clusters associated with sophisticated market demand have higher productivity and competitive prices, adapt quicker to market changes and inherit a higher innovation rate. Consequently, it is important that authorities try to integrate leading market companies by legislating favourable regulations and providing incentives. Additionally, although on a moderate level, government regulations that have direct effects on market standards and enable standardized quality information of logistics services can be quality-enhancing.

#### Market Implication II

Logistics City-Clusters need to attract and integrate markets that have sophisticated demands in terms of logistics and supply chain capabilities, by:

- (i) promoting the competitive advantage of the functional enablers, tailored to particular market segments and their commodities.
- (ii) legislating favourable market regulations and providing incentives.
- (iii) considering regulations that have direct effects the market quality standards and by enabling access to quality information of logistics services.

Indeed, the identification of the economic strength and nature of the market sectors is critical, since the functional enablers must reflect market requirements in the most reliable and efficient way. Consequently, the recognition and evaluation of core market segments will catalyse new initiatives or modify existing strategic priorities. This is significant for the commitment of resources towards the functional enablers to increase their capabilities and attractiveness for local, regional international demand. Important here is also the continuous analysis of the market accessibility and therefore the dynamic character of geographical proximity and topographical conditions.

**Market Implication III**

Logistics City-Clusters need to continuously monitor and analyse their markets in terms of size, quality and location to emphasise new initiatives or modify existing strategic prioritisation, by:

- (i) focusing on the market segments percentage of the GDP and its growth rate, but also considering the number of leading firms and total employment.
- (ii) appreciating the dynamic character of geographical proximity and topographical conditions predefining accessibility to markets (e.g. distance, time, cost).

### 10.3.1.2 The infrastructure enabler

The infrastructure enabler is segmented into three distinctive elements: (i) ‘Logistics-Infrastructure’, (ii) ‘IT-Infrastructure’ and (iii) ‘Social-Infrastructure’, each of which have their individual but interdependent roles. The logistics infrastructure component consists of primary and secondary multimodal transport and gateway infrastructure. These elements must link into a mutual network to allow streamlined and efficient physical flow of goods. However, the infrastructure network-approach is challenged by the stakeholders’ competing priorities, the diverse responsibilities of authorities and the incompatibilities of private and commercial users. Indeed, logistics infrastructure must be appropriate and effective, which can be defined in a threefold way. First, there is the notion of quality and second that of efficiencies. Whilst both are core parameters contributing to the level of infrastructure excellence, there is thirdly the quantitative notion of infrastructure capacity and amount.

**Logistics Infrastructure Implication I**

Logistics City-Clusters need long-term spatial planning that allows the development and maintenance of primary and secondary logistics infrastructure linking into a holistic network, by:

- (i) introducing an overseeing infrastructure planning commission to overcome current challenges and to encourage collaboration of authorities, industry and the community.
- (ii) considering long-term land reservation and spatial restructuring to allow the development of critical logistics infrastructure capacity to handle future growth.
- (iii) including the notion of quality planning to ensure excellent infrastructure.

Generally logistics infrastructure capacity is challenged by competing spatial land allocations and long infrastructure implementation times. Interestingly, these factors combined with vast trade growth are forcing new technologies and processes to

increase the utilisation of existing infrastructure. However, purposeful spatial planning and new developed infrastructure, as discussed above, are critical in ensuring a competitive cluster. Indeed, the alignment of infrastructure towards advantageous topographical factors can reduce its development cost and simultaneously increases effectiveness. This is critical, since geographically favoured infrastructure has the potential to act as the core connectivity to regional and international markets, based on the economic advantages of efficient market accessibility.

**Logistics Infrastructure Implication II**

Scarce land for logistics infrastructure development and existing infrastructure capacity must be used purposefully to justify associated costs and to address competing urban interests, by:

- (i) focusing on infrastructure that are favoured by the topographical conditions.
- (ii) prioritising infrastructure development linked to the identified core markets.
- (iii) applying compulsory acquisition to enable infrastructure development, if necessary.
- (iv) enforcing regulations that enable adequate access to infrastructure.
- (v) introducing innovation initiatives that facilitate higher utilisation of existing infrastructure.

Both physical and virtual ICT infrastructures play a major role, since they increase the capacity of logistics infrastructure and enable service efficiencies. For the physical component, the foundation of the virtual ICT element, appropriate long-term planning, similar to the logistics infrastructure enabler is critical. Indeed, it can be integrated in the governments' overall infrastructure scheme and should be favoured by planning regulations. This vision ensures that later modifications to meet future requirements, which are very costly and time consuming, are minimised. To be a competitive and attractive cluster it is also necessary to integrate a virtual information platform. Important here is that it should not only focus on trade gateways, but needs to be considered at the Logistics City-Cluster level. Consequently, to guarantee success of a platform, the use of different information software options, enabled by SOA, is essential. This will facilitate efficient and low cost information flow and data sharing, benefiting the entire system. However, the government's role as a driver for an effective strategy to implement an information platform is currently limited.

**ICT Infrastructure Implication I**

Logistics City-Clusters need long-term planning and implementation schemes for both physical ICT infrastructure and integrated one-stop information platforms, through:

- (i) identifying the possible future demand of the actual users and aligning the physical and virtual ICT infrastructure accordingly.
- (ii) implementing the latest physical ICT technology.
- (iii) focusing on an integrated information platform at the cluster level that brings all private and governmental stakeholders together.
- (iv) allowing access of different software options.

The core role of social infrastructure is to attract, develop and retain a skilled workforce. In this regard, appropriate proximity and accessibility of social infrastructure, which is determined by the nature of the social demand and the economic situation, is

important in order to achieve workforce-stability. Although there is only a moderate relationship between social infrastructure and the sophistication of the core activities, it is clearly understood that the higher the quality and better the accessibility of social infrastructure, the easier it is to attract and keep specialised labour. Authorities can support the provision of accessible social infrastructure, by aligning infrastructure investments with the characteristics of the workforce requirements, through land use arrangements and planning control.

**Social Infrastructure Implication I**

Logistics City-Clusters need to identify the core demands and requirements of the workforce to provide and develop appropriate social infrastructure, by:

- (i) correlating the nature of the community demand with the convenient accessibility of social infrastructure.
- (ii) concentrating on the social demands of workforce-sectors that are currently not sufficiently available and generally focusing on sophisticated social infrastructure.
- (iii) ensuring continuous analysis of current and future social demands of the labour force.

### **10.3.1.3 The service enabler**

The core activities for Logistic City-Clusters are separated into lower and higher value-add logistics activities. Lower value-add activities are one-dimensional and reduce costs through economy of scale and standardisation. These basic activities are determined by trade gateways and shape the character of the higher logistics value services. Higher value-add activities are tailored to particular customer demand, have multi-dimensional functions and bind complex logistics components together as a system. In this context, Logistics City-Clusters include both pure logistics service providers and the in-house logistics activities of market companies. Indeed, outsourcing of lower value-add logistics activities appeared fairly early, whereas the outsourcing of higher value-add services is a developing trend. It was found that government co-ownership for logistics services exist for critical functions in which private power is limited and is being considered for start-ups focusing on the implementation of new technologies. There are also logistics-relevant activities that are fully government owned, which have the potential to increase their competence. Further, the service enabler subsumes a complex suite of supporting activities that are demanded by the logistics sector. These can compete with logistics services for other functional enablers. Nevertheless, the existence of high quality supporting activities, which are appropriately accessible, increase the likelihood of positive long term development as an organic system.

#### **Service Implication I**

Logistics City-Clusters need to efficiently integrate lower, higher value-add logistics activities and supporting services to ensure a positive future development, by:

- (i) focusing on convenient accessibility of the services to each other and the markets due to their reciprocal linkages.
- (ii) aligning the other functional enablers towards the logistics services such as infrastructure development or workforce education.
- (iii) finding optimisation potential of the government operated services by in-depth analysis of their performance measures.

A critical mass and mixture of logistics activities facilitate agglomeration benefits such as cost reduction due to joint utilisation and faster exchange of knowledge. This results in increased innovation and workforce specialisation. Consequently, these benefits, in combination with appropriate urban constructs, attract further logistics operators, supporting activities and market segments. In this context, governments try to attract and integrate logistics and supporting services through indirect subsidies, favourable land use regulations and lower legal and administrative barriers. However, the provision of direct subsidies is not strongly advised, since exaggerated support without pertinent reasoning can create a climate of dependency. Additionally, efficient accessibility to the markets due to favourable geographical factors creates benefits, as commented in the market implication, which attracts logistics operators.

#### **Service Implication II**

Logistics City-Clusters need to introduce a critical mass of logistics and supporting services of appropriate quality to enable agglomeration benefits and to facilitate regional market strength, by:

- (i) prioritising the logistics sector in the regional economic development plan to stimulate beneficial regulations or earmarked investments.
- (ii) attracting quality key players through indirect subsidies, favourable land use regulations and low legal / administrative barriers.
- (iii) considering direct subsidies only in areas that create positive externalities that are unpriced in combination with stimulative requirements.
- (iv) focusing on the expansion of the higher logistics value-add sector, since the outsourcing of these activities is increasing.
- (v) monitoring the logistics segments to support the decision-making processes in terms of restraining or stimulating various sectors.

#### **10.3.1.4 The workforce enabler**

The workforce enabler is segmented into un-/semiskilled and highly skilled workforce. Whilst the former segment, the major employment group, requires appropriate short term training or vocational education, the latter by comparison, needs long term and costly training. It was also found that there is an ongoing change in the workforce specialisation from traditional un-/semiskilled functions towards more skilled labour. Indeed, an educated and specialised workforce adds value by increasing productivity, strengthening operational and strategically capabilities, and developing innovative services. Hence, it makes the Logistics City-Cluster more competitive, and it is in this

context that politics, in cooperation with industry, can push for higher education standards by updating curricula, providing state-of-the-art facilities and employing excellent educators.

**Workforce Implication I**

The education and training for both workforce segments should not be left to chance, and should be fostered by:

- (i) dedicating earmarked education funds.
- (ii) implementing a strategic training and education framework in cooperation with the logistics industry and education providers.
- (ii) creating specialised logistics education centres and ensuring that teaching is a prestigious and valued profession with appropriate remuneration.
- (iii) ensuring accessible and affordable education to facilitate beneficial working potentials.
- (iv) aligning education frameworks according to the dynamic and changing skills environment.

Logistics City-Clusters involve constant competition for all levels of labour. In this context, the fact that logistics is associated with hard labour, low career and income prospects, can contribute to workforce scarcity in the un-/semiskilled segment. Additionally, the low reputation of the logistics sector can increase scarcity of highly skilled workforce, but also the lack of tertiary education and social infrastructure has a moderate effect. However, the availability of workforce is crucial for the long term success of clusters, specially the highly skilled workforce due to their decision-making power and direct developmental influence. Consequently, collaborative planning between government and industry is of the highest importance for a balanced workforce. This does not only account for workforce education, but also takes into consideration the enhancement of living quality and attractiveness of the logistics area.

**Workforce Implication II**

Logistics City-Clusters need to ensure that scarcity of a quality workforce is avoided, by:

- (i) monitoring workforce development in terms of current situations / future trends and initiating tailored actions in case of possible challenges.
- (ii) considering marketing campaigns to increase the potential employer base for logistics.
- (iii) developing adequate social infrastructure to attract and retain dedicated workforce.
- (iv) focusing the development of the workforce on a local and regional level.
- (v) allowing skilled immigration if a regional skilled and motivated workforce is not accessible.

### **10.3.1.5 The knowledge enabler**

Knowledge creation in the logistics sector is still a contested notion. This is based on the lower innovation intensity and perceived lower skills needed for many logistics activities. Additionally, R&D expenditures for logistics chain innovation do not emerge spontaneously from the industry since possible benefits can disperse externally. However, logistics innovation, in the area of engineering and business/management sciences, is of growing importance and its core role is to enhance the competitiveness of a Logistics City-Cluster in an increasingly complex trade environment. In this

context, competitive advantage is derived from innovation benefits such as cost savings, increase of service quality and productivity. An interesting finding is that the logistics industry itself is only a moderate core driver for knowledge creation, but logistics companies provide direct financial support for publicly driven research centres and recently there is a minor trend that they develop their own research departments. Consequently, the government sector, as discussed below, and market segments are main innovation forces, whilst a high agglomeration of logistics companies will push innovation due to a competitive environment.

**Knowledge Implication I**

Knowledge generation should be factored into Logistics City-Cluster development to access innovation benefits, by:

- (i) integrating public logistics innovation centres focusing on the engineering and business/management sciences.
- (ii) stimulating direct private company investment into logistics-related innovation through demanding markets and a high competitive level in the logistics sector.
- (iii) reinforcing direct financial support by the logistics operators for external research platforms.

It is of great importance to continuously develop a robust and expanding knowledge base. However, it needs to be understood that this not an easy undertaking, especially when considering the time and monetary resources that are required. In this regard, governments play a significant role in logistics innovation by focusing their initiatives directly on the establishment and ongoing support of research platforms. Close proximity of research centres to the actual logistics activities is essential to enable efficient exchange of ideas and better implementation of innovations. Currently direct public financial support for the logistics industry is only applied to stimulate new ideas, which is immediately reduced when private market forces take over. Of more importance is the governments' support enabling collaboration between the private sector and the publicly-driven research centres. The core benefits, based on this combination of individual strengths, are the efficient deployment of scarce resources, the reduction of duplicated actions, the increase in practical implementation and motivation for future innovations.

**Knowledge Implication II**

Logistics City-Clusters need to focus on long term and ongoing strategic planning for applied logistics innovation to preserve its quality status, by:

- (i) ensuring appropriate basic funding, research grants and scholarships for logistics research institutes and university departments.
- (ii) encouraging research centres to be located in close proximity to the actual logistics activities.
- (iii) considering co-funding, research grants and tax deduction possibilities for logistics companies, especially when ideas and technology just start to emerge.
- (iv) motivating collaboration between the private sector and the publicly-driven research platforms through co-funding and the removal of administrative or legal barriers .

### 10.3.1.6 The capital enabler

Although logistics activities are perceived as moderately capital intensive, favourably tailored capital conditions for logistics operators will encourage their natural growth by enabling investment in facilities, equipment, innovation and business expansions. Certainly, it can make a significant difference for a cluster, but the micro level concerns of the actual service providers need to be considered since there are complex differences within the logistics sector. Interestingly, in this context, favourable capital availability for a few particular segments have positive flow-on effects to associated activities, increasing the competitive position as a holistic cluster. The study elaborated that capital needed for logistics operational functions is mainly associated with private institutions, but its availability and conditions are influenced by governments. Hence, the moderate influence by politically-framed regulations, interest rates and a positive position towards foreign capital can encourage stronger logistics investments and a positive cluster development.

#### **Capital Implication I**

Logistics City-Clusters need to accommodate private capital demand to guarantee efficient logistics operational functions and a prosperous growth, by:

- (i) facilitating tailored capital conditions for the particular core logistics functionalities through a cooperative arrangement of the private and public sector.
- (ii) enforcing appropriate favourable regulations, interest rates and allowing investment by foreign capital.
- (iii) providing direct subsidies or interest-free loans to the logistics operators only when critical.
- (iv) reviewing policies and regulations that impact on capital conditions regularly and align them if necessary.

Certainly, capital investment by governments for the development and maintenance of infrastructure is critical. Consequently, clusters that have access to sufficient capital and can arrange maximum allocation of earmarked funds have a competitive advantage. However, increasing cost and the concern that capital demand of authorities outweighs the supply, results in resource allocation conflicts. In such an environment, the involvement of the private sector as an auxiliary capital support is sought after to ensure satisfactory infrastructure facilitating efficient logistics operations and further attraction of economic activities. It was found that governments have a leading role in PPP arrangements, but have less influence towards user-pays systems and then generated funds. Indeed, governments need to understand that private investment is not the final solution of constrained public budgets, and that economic liberalism holds threats since private investors may only participate in profitable infrastructure elements. Additionally, investors need to objectively evaluate and balance return assumptions and up-keeping of infrastructure.

### **Capital Implication II**

Logistics City-Clusters need to budget and allocate sufficient financial resources for infrastructure development to accommodate current and future logistics activities, by:

- (i) focusing on their core logistics operations and their infrastructure demand.
- (ii) involving the private sector as an auxiliary support if capital demand outweighs supply.
- (iii) considering both the negative and positive implications of private capital involvement in infrastructure development, instead of solely drawing attention to individual benefits.
- (iv) addressing possible challenges of private involvement for the community.
- (v) transparently allocating raised capital from user-pays systems for the maintenance and expansion of infrastructure.

#### **10.3.1.7 The competition enabler**

There was a significant positive correlation between the existence of competition and the effect of efficient logistics operations, appropriate prices, quick adoption of market demands and increased innovation. Indeed, no universal competitive strategy exists and therefore, to allow competition benefits, it is necessary to distinguish between intra- and inter-competition of a Logistics City-Cluster and a sub-differentiation of traditional gateways activities and logistics services.

Lack of intra-gateway competition can have negative effects on prices and quality, which is of special concern when the inter-gateway competition is not sufficient. However, forcing intra-gateway competition due to investments in multiple transshipment activities is not always advisable, since if trade volumes are not supportive it can lead to land wastage and loss of capital. It was found that, on some occasions, gateway activities are established and operated by the actual demand driver in order to reduce negative monopolistic effects. However, this only stimulates competition if subject to open accessibility and external pricing. Interestingly, competition between other logistics activities forms a much higher competitive intra-environment, because of lower economic entry barriers and smaller required market sizes. Entry barriers, however, will multiply with increasing value-add nature of the services, because higher skills are needed. In this context, governments stimulate competitive behaviour by regulations that reduce legal entry barriers and prevent power concentration in the case of sufficient market sizes. In the event of small markets and sufficient inter-competition, governments tend to lower the critical market mass by providing necessary facilities and lease those to different operators who will then compete. It seems that stringent political strategies such as price monitoring and access regulations are required when the market demand is small and the inter-competition is not sufficient.

#### **Competition Implication I**

Logistics City-Clusters need to address intra-competition for gateway activities and other logistics services to enable competition benefits, by:

- (i) stimulating high trade volumes for a competitive gateway environment through multiple linkages with local, regional and international markets.
- (ii) not investing in multiple transshipment activities if trade volumes are not supportive, but rather lowering the critical market mass or introduce pricing policies.
- (iii) implementing regulation or control mechanisms that enable external pricing and open accessibility of privately owned gateways.
- (iv) reducing legal/administrative entry barriers to encourage the settlement of logistics activities and enacting anti-trust law to reduce power concentration.

Inter-gateway competition is associated with efficiencies of reaching the markets by logistics infrastructure. Hence, the better the connectivity in terms of price, time and preferred transport mode, which is also defined by the geographical factors, the more volume that can be attracted. However, these factors are interpreted differently for each commodity type and therefore the identification of the economic strength and nature of the market sectors is decisive. Certainly, the more comparable the factors and standardised the cargo flow are, the stronger the inter-gateway competition can be. Inter-competition for other logistics services is correlated to location advantages and is not only between clusters but to any other locality. These are primarily determined by infrastructure quality, market proximity, land prices and workforce availability. Indeed, each logistics sub-sector have different foci, such as some higher value activities weighting the factor of social infrastructure higher than land prices. The study also detected a strong correlation between inter-competition and proximity. Certainly, the closer localities are to each other, the stronger their competitive behaviour since their efficiency determinants, location advantages and legal boundaries are more comparable. However, the relationship of proximity and competition is dynamic due to exogenous political or economical reasons.

#### **Competition Implication II**

Logistics City-Clusters should not overlook the importance of inter-gateway competition. It should be seen as beneficial for the cluster since it is forced to stay competitive, by:

- (i) ensuring high quality trade connectivity, since efficiency of reaching the markets is critical for attracting trade volume.
- (ii) providing a competitive profile in regards to social and logistics infrastructure, market connectivity, skilled workforce and land prices in order to attract logistics companies.
- (iii) mapping its location advantages and communicating these to the companies which need to be attracted.
- (iv) monitoring the inter-competitive environment and if changes occur which threaten the current advantage, initiate corrective actions.

### **10.3.1.8 The integrating governance enabler**

The co-ordination of all stakeholders, whilst not disturbing competition, strengthens the development of Logistics City-Clusters. An optimal governance structure is seen as a

mediating platform by which the stakeholders are informed, guided and coordinated in a collaborative manner. It reduces duplicated and opposing activities, decreases the effect of unclear division of work, lack of accountability and leads to continuous modification of better overall policies and regulation. Governance needs to be based on trust and commitment, which is enabled by the stakeholders' dedicated participation, but also by providing financial support for its operation. Further, fair consideration of all stakeholders is a vital requirement, since it enables a consensual basis and ensures that existing structures and decision-making institutions are not overlooked. However, a governance structure at the cluster level is not yet a distinctive feature, and is currently driven by single gateway authorities and partly by logistics associations. This is not optimal due to their narrow focus and limited administering power. Indeed, bringing many stakeholders together in a workable governance structure is not easy, and consequently the presence of a strong political determination and initial financial stimulation seems to be a necessary precursor.

**Governance Implication I**

Logistics City-Clusters should introduce a governance model that allows co-ordination of the complex and multi-actor driven environment to facilitate a holistic development, by:

- (i) focusing on the establishment of a third party mediating governance body that brings all relevant public and private stakeholders together.
- (ii) consulting all core stakeholders early on to ensure that social regional factors (e.g. political system and its values) are embodied in the governance system.
- (iii) ensuring widespread awareness and understanding of the governance strategic direction.
- (iv) facilitating commitment, trust and equal character for a collaborative governance system.

The governance body, as a mediating platform, enables the exchange of ideas and knowledge. In particular, it needs to align the work of the stakeholder in the area of infrastructure development and identify regulatory impediments for logistics functionalities that are necessary to amend. Additionally, international marketing campaigns that address the competitive advantage of the cluster can be initiated to enable an increase in global business opportunities and connectivity. Indeed, the topic of knowledge creation and education for the workforce requires strong attention to facilitate efficient operations and future innovations that increase the competitive advantage of the cluster. However, the detailed definition of the tasks and objectives should be based on a survey involving all core stakeholders within the clusters' region.

**Governance Implication II**

Logistics City-Clusters should focus on the identified objectives, whilst adjusting them to their unique governance structure, by:

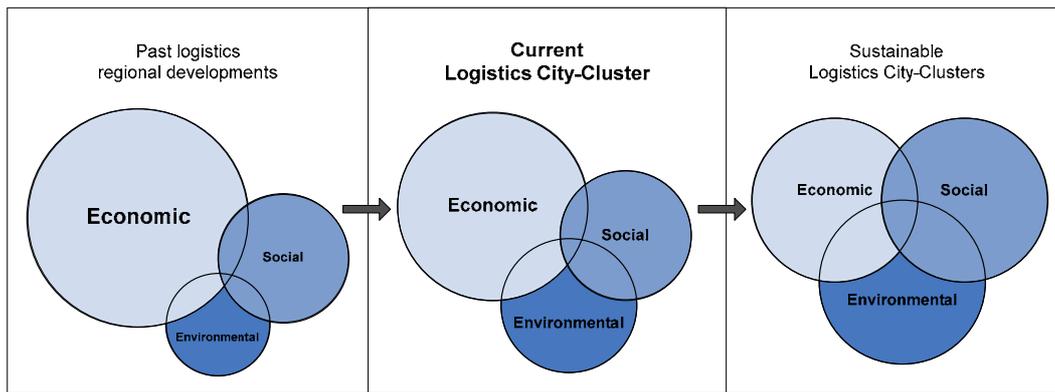
- (i) initiating regular meetings with the stakeholders' representatives to exchange ideas, identify challenges and create taskforces within the identified objectives.
- (ii) guiding the decision-making process and implementation of ideas whilst leaving their executions to the respective stakeholders.
- (iii) developing KPIs associated with the key objectives to measure results of the governance body and communicating these with the stakeholders to increase commitment and trust.

### **10.3.2 The impact categories - Implications**

The impact category represents the effects of the Logistics City-Clusters' core activities on the regional economy, the community and its consequences on the environment. Hence, it is built upon the three pillars of sustainability. Indeed, sustainability acknowledge that there are limits to the systems and therefore Logistics City-Clusters must be managed in ways that ensure that the economy can continue to grow without destroying the natural environment on which the society depends. It is in this context that the answer to the research question that led to the development of this category is rather complex.

First, based on the analysis of the economic, environmental and social impacts, it is concluded that sustainable development is currently limited. Logistics City-Clusters, as a development strategy, holds positive outcomes for the regional economy in terms of income, employment and value-add creation. However, the environmental impact is a negative factor due to pollution, contamination and land degradation. The social impact is both positive and negative. For example, hazardous environmental impact adversely affects the local community by decreasing their quality of life and can further damage their physical and emotional well-being. On the other hand, the positive economic impact increases living standards and people's material well-being. Further, the income for governments based on the logistics activities enables funding for social services and infrastructure that increases the quality of life aspects.

Second, the economic dimension is still the dominant factor for the establishment of a Logistics City-Cluster. As validated, macro (e.g. pressure to create employment) and micro economic forces (e.g. lack of perceived internal benefits when being eco-friendly) confound the need of a more sustainable behaviour. However, the environmental and social pillars have gained importance, due to external (e.g. government regulations) and internal forces (e.g. company objectives to increased productivity). It is in this context that there is an increasing tendency towards a more sustainable development in the participating clusters. Consequently, whilst a sustainable development has not currently been achieved, its importance for a successful Logistics City-Cluster is increasing (Figure 10.3-3).



**Figure 10.3-3: The path of Logistics City-Cluster in regards to sustainability**

Sustainability is a desirable development path for a Logistics City-Cluster, however a balance of the three dimensions is hard to achieve. Indeed, the trade-offs between the three dimensions make it rather difficult. In particular, the lack of responsibility regarding the trade-offs appears to be the main impediment to actually achieve sustainability for a Logistics City-Cluster. Indeed, there is a greater demand for attention to the interaction between the economic, environmental and social issues, which needs to be addressed. However, there is always the question of how best to influence decision-makers and all other involved actors. There is no universal answer, but the governance enabler can play a significant role as a possible formal capacity to respond to these challenges. The participation of all stakeholders, including the community perspective, would increase the legitimacy and credibility of any needed institutional change towards better integration of economic, environmental and social issues involved in the development of a Logistics City-Cluster. Another rather difficult factor for the achievement of sustainable cluster is that whilst economic and environmental impacts are well established and understood, the social effects are not fully grasped. This seems to result from the fact that the social dimension is difficult to measure and has a strong subjective character. Indeed, the relative contestation of the social dimension demonstrates the sensitivity and complexity of the issues involved.

### **10.3.2.1 Economic impact**

Although the total employment in the logistics sector per ha is lower than in other sectors, the Logistics City-Cluster is an innovative employment strategy to balance declining occupations in other industries. This is especially favoured when trade gateways pre-exist, land is available and advantageous geographical factors can be built upon. Additionally, regional workforce demographics that are linked to logistics requirements are beneficial. Important here is that logistics does not only provide direct employment for the region, but also indirectly by the supporting industry sectors.

Indeed, there are high and low skilled employment possibilities, whereas a slight shift to skilled areas involving technological competence and process expertise is predicted.

The level of payment in the logistics sector appeared to be modest when comparing with other service industries. Nevertheless, the Logistics City-Cluster as a generator of income for people provides stability for the region. The core role, besides providing financial independence of the people employed, are the flow-on effects of income. It induces additional value, employment, tax and income in the region due to the household expenditures. Indeed, this spending round increases the economic strength of the region and further secures stability within the community.

Logistics City-Clusters are generating value-add for the region, which can be directly associated with regional GDP. Indeed, the average growth rate of the logistics value-add function, derived from the GDP, is a useful indicator about the economic strength of a Logistics City-Cluster and its contribution in the regional economy. Beyond the direct value-add creation of the logistics services, there are also indirect effects, which act as catalysts for further regional economic development generating new opportunities beyond the logistics sector.

The region and its authorities benefit from the raised revenues in form of taxes and duties that are generated by logistics activities. However, it seems that the taxes and duties impact on a different magnitude. First, the value-add and income tax are more significant than trade and payroll tax. Second, the duties generated from user-pay systems are less important than import/export duties. These revenues for the government can be dedicated to further strengthen the enablers of the cluster, which then increases the possibility for more revenue generation since additional economic activities are attracted. Yet it needs to be understood that not all generated income is allocated at regional level; some will be redirected to state or federal institutions. The actual allocation of taxes and duties depends on the nature of the revenue sources and the political system to which the region is bound.

Indeed, Logistics City-Clusters are an appropriate strategy to stimulate economic growth in a region. Having a critical mass of integrated core activities which perform at a superior level will lead to a more powerful regional economic situation. If, for example, the government eases trade regulations, the result will be an increase in import/export and all its related logistics activities. This also strengthens the local and

regional market segments and supporting industries, which will further enhance the economic situation of the region due to indirect and induced flow-on effects. However, the increase can be disproportionately high or low, depending on many factors such as technology (e.g. automation) or strategies (e.g. integration of valued-add activities).

#### **Economic Implication**

Logistics City-Clusters need to ensure a critical mass of qualitative core activities to further stimulate beneficial economic growth, by:

- (i) using the GDP indications to support decision-making processes to restrain or stimulate the logistics sector.
- (ii) attracting and integrating sophisticated logistics activities.
- (iii) focusing on supply chain operations, warehousing and contract logistics since these hold high value creation potential, whilst not neglecting traditional activities.
- (iv) allocating revenues from taxes and duties efficiently to the enabling system, especially towards infrastructure, workforce education and knowledge.
- (v) contemplating indirect and induced effects, which hold a massive potential for the region.

### **10.3.2.2 Environment impact**

The impact on the environment is concluded as negative and is segmented into: (i) pollution and contamination, (ii) degradation due to land use and (iii) effects of noise, odour and visual appearance. However, rising environmental awareness has resulted in two interdependent approaches to minimize these negative impacts. First, there are new logistics strategies or operational processes and secondly there are environmentally-friendly technologies. These approaches are mainly concentrated on the reduction of the hazardous effects caused by lower value-add logistics activities and associated infrastructure elements.

Pollution and contamination relates to the negative effects on the atmosphere, water and land surface. Although the final effect of emissions is more global than local, it is the core negative impact induced by a Logistics City-Cluster. CO<sub>2</sub> is associated with transport activities and when correlating it per ton/km, road transport and aviation appeared to be the key polluter. In comparison, for nitrogen and sulphur oxide emissions, the maritime sector is the primary source. It was found that contaminations of land and water areas due to transport and transshipment activities mainly appear within gateways and along the trade corridors. But also, the development and maintenance of logistics infrastructure has a moderate polluting effect.

#### **Environmental Implication I**

Logistics City-Clusters should minimise the negative effect of pollution caused by logistics activities whilst stimulating regional economic growth, by:

- (i) focusing on multimodal transport as a strategy to lower the emission per transport unit across the entire supply chain.
- (ii) increasing the utilisation rate of transport capacity through cooperation of different haulage companies and real time information allowing continual modification of routes and schedules.
- (iii) implementing clean engine technologies and considering the instituting of special emission zones.
- (iv) introducing environmental regulation, higher safety standards and cleaner technologies to reduce land and water contamination along trade gateways and corridors.

Degradation of surface areas is linked to logistics activities and infrastructure that utilise or build on given land and water zones. Indeed, the allotment for logistics infrastructure and services destroys natural green habitats that can be lost on a long term basis. In a maritime focused Logistic City-Cluster there are also moderate hazardous effects on the maritime eco-system due to land reclamation and dredging.

#### **Environmental Implication II**

Logistics City-Clusters should minimise environmental degradation due to land / water use caused by logistics infrastructure, whilst stimulating regional economic growth, by:

- (i) enforcing environmental impact studies before commencing infrastructure developments, which result in a list of actions to reduce possible negative effects.
- (ii) ensuring relocation of endangered habitats and land reservation to offset vegetation losses.
- (iii) encouraging refinements of technology and efficient management processes when developing and maintaining infrastructure.
- (iv) considering better designs and technical innovations that enable a higher degree of land utilisation of logistics facilities and infrastructure.

The final substantial negative aspect which is however not as strong as the other two impacts combines the effects of noise, odour and visual distraction. Odour and noise is primarily associated with transportation, transshipment and warehousing operations, whilst infrastructure development is a moderate factor. The effect of visual impingements primarily results from massive logistics infrastructure and less from logistics operational functions.

#### **Environmental Implication III**

Logistics City-Clusters minimise odour, noise and visual impingement caused by logistics activities and infrastructure, whilst stimulating regional economic growth, through:

- (i) reducing noise through anti-noise barriers, sound proofing of facilities and quieter technologies.
- (ii) minimising possible odour through filters and better technologies.
- (iii) upgrading landscaping standards that harmonise with the surrounding environment and encourage the use of new design elements that create positive visual effects.
- (iv) focusing on spatial planning and its associated buffer zoning to minimise disturbance of the nearby environment.

The environmental impact must be considered as a holistic system and should not be strictly separated in particular functions. Therefore it ought to be aimed at creating an environmental management framework for the holistic Logistics City-Cluster and to

further raise the environmental awareness of all stakeholders by providing or supporting specialised campaigns and training.

### 10.3.2.3 Social impact

The social impact is categorised in three core areas: (i) the notion of liveability, (ii) the affect of material well-being/work and (iii) the interconnectedness of the community. Liveability, the core social impact, deals with three subtleties. First, the discussed environmental hazards have a negative effect on the community, such as emotional ill-being and physical health problems. However, this depends on the degree of exposure and the conditions of individuals. Second, there is a positive impact on the liveability factor due to the enhancement of infrastructure based on the government revenue raised from logistics activities. There is also a reasonable positive impact on the leisure and recreation opportunities, but not as strong when comparing with social infrastructure development. Third, the overall better transport infrastructure results in better connectivity and flexibility of the community. However, structural congestions can reduce this positive effect by causing personal distress, especially when infrastructure is ill-adapted. Additionally, high commercial transport intensity represents a minor threat for accidents, reducing liveability for the community slightly.

#### **Social Implication I**

Logistics City-Clusters need to increase the community liveability factor in order to retain and attract qualified workforce, by:

- (i) protecting the community from negative environmental effects by introducing eco-friendly approaches.
- (ii) dedicating government revenues for social infrastructure to increase its quantity, quality and accessibility.
- (iii) ensuring efficient administrative procedures and well adapted transport infrastructure to minimise structural congestions and reduce the threat of traffic accidents.

The affect of material well-being associated with the income from logistics activities enhances regional financial stability and increase peoples' sense of well-being. It has a reasonable positive impact by decreasing anti-social behaviour, providing a stable life, increasing living standards and creating a positive self image within the community. These positive effects are especially important for a Logistics City-Cluster, since the majority of the workforce is employed in the unskilled/semiskilled sector. However, there is a trade-off between life-balance and earning an income. Indeed, logistics is associated with challenging working conditions and this can have negative effects on health and social life for both workforce segments.

#### **Social Implication II**

Logistics City-Clusters need to guarantee the material well-being for the community and address challenging working conditions in the logistics sector, by:

- (i) ensuring fair and suitable payment for the workforce.
- (ii) encouraging an appropriate work-life balance without challenging the smooth operations of the logistics sector.
- (iii) addressing sufficient work safety measures within the logistics industry.

The final sub-category comprises three ideas. First is the community belonging and identification that are critical elements for the notion of well-being. In this context, it was found that logistics firms can meet these requirements through social investments (e.g. facilities, events, learning cluster), which only exist currently on a moderate level. Secondly, trust and influence of the local community towards the logistics sector is an important element. Indeed, if the community is informed and involved in logistics regional development, the peoples' needs, values and opinions are acknowledged, which reinforces appropriate public behaviour and well-being. Third, due to the international character of logistics, the clusters have a wider culture base in their communities. This international cultural influence has a positive effect since it enhances the variety of life aspects and strengthens the international business behaviour. However, possible challenges based on different cultural values and beliefs can occur.

#### **Social Implication III**

Logistics City-Clusters must address the notion of community belonging, trust and influence to facilitate well-being in the metropolitan area, by:

- (i) promoting community investments such as in social facilities, events or learning clusters.
- (ii) informing and involving the community in logistics regional development.
- (iii) focusing on the positive aspect of an increasing international community character.
- (iv) addressing possible challenges based on different cultural values through community investment.

## **10.4 Significance and knowledge claims of this research**

The developed framework is a unique elaborated knowledge base of a Logistics City-Cluster and clearly defines and distinguishes them from other existing logistics structures. Consequently, it provides a significant contribution to knowledge by enhancing current understandings of the phenomenon. In particular, it fills the gap in the conception of unique Logistics City-Cluster determinates by a structured description of the enablers' properties and their interdependencies. In this context, the major external factors influencing the dynamic enabler system are explicated and their effects are critically examined. Also significant is the comprehensive qualitative knowledge of the impact on the regions that a Logistics City-Cluster generates. Whilst the framework

not only offers a credible and widely applicable explanation at a micro category level, it brings together a holistic macro framework that determines the current state of the art.

More importantly, the framework holds the potential for the efficient planning of Logistics City-Clusters to derive a competitive advantage and to facilitate sustainable regional growth. In particular, the framework contributes to the practitioners' insight of a possible Logistics City-Cluster setup, based on the enabling and influential categories, and it increases the awareness of likely outcomes affecting the region. However, the major contribution for the practitioner is the insistence that the Logistics City-Cluster concept is a holistic system in which all categories have dynamic interdependencies. Hence, the categories cannot be dealt with separately, but must be seen as a system, when attempting to achieve long term success. Indeed, the fact that the framework is derived and validated on the actions and experiences of executive experts of world leading clusters underpins its potential in this regard.

Consequently, the framework, by understanding prior the most important elements and their interrelationships, can be used as a tool-kit that offers detailed knowledge for a fully integrated planning model to facilitate the expansion or modification of Logistics City-Clusters in urban growth areas. This provides a roadmap to follow, allowing the efficient allocation of required resources to accomplish the anticipated regional impact. The framework, as a broad planning concept, requires collaboration between different governmental authorities, industry stakeholders and communities. This collaboration provides the basis for an integrated development and the holistic consideration of possible impact. It is therefore posited that the governance enabler, as one of the strong findings, needs to be emphasised. It is also critical that the framework needs to coexist and be integrated with existing regional development programs and guidelines. Hence, this generic framework needs to be adapted to the particular regional planning tools and its requirements.

The consideration of the framework and the holistic application of the micro implications for stakeholders involved in the regional development will allow the cluster to develop and maintain its position as an important supply chain gateway. In parallel with this, it will also facilitate the development of liveable, high quality communities that are less impeded by the negative environmental effects of freight movements.

Indeed, currently aspects of this generic framework have been adapted to inform a Logistics City-Cluster policy for the Victorian State Government in Australia (Nagel,

2009b). This work has led to a further tailor-made 'scoping framework' that has been used to investigate the introduction of a possible Logistics City-Cluster for the Western Metropolitan Region of Melbourne (Nagel, 2009c). Further, elements of the theoretical and empirical framework created in this PhD study, in combination with the general assessment of the Western Metropolitan Region of Melbourne, were transformed into a specific spatial allocation framework (Sengpiehl et al., 2009a).

## **10.5 Limitations of the study and suggestion for further research**

The research was of exploratory nature due to the limited literature and the inherently constructive nature of the conceptual environment. Because the applied constructivist paradigm rejects the view that there is a single objective truth, but instead argues that meaning is developed in concert by various social actors (subjects) that are most intimately involved with the concept (object), this work was an inductive and interpretive approach. This introduces some limitations since constructed knowledge is likely to change over time and depends on the particular background of the subjects. Consequently, the generalisation of the framework is limited to the sample frame of this study, since it is a mosaic of their reality. First, as the data collection was based on the region of Europe, Asia Pacific and Dubai, the framework is specific to those areas. Second, although the framework was kept as generic as possible, it is limited to the agglomeration of logistics activities in a metropolitan environment. Third, the framework is based on the current understanding of a selected group of executive experts and therefore might need to be adapted over time. However, it is believed that the major categories and sub-categories will stand, given that these are based on theoretical agglomeration theories that date back to the 19<sup>th</sup> century. Nevertheless, the in-depth properties are most likely subject to changes, and practitioners or academics wishing to apply this framework will need to carefully modify properties to their particular planning environment.

Nevertheless, although the empirical framework at this stage cannot be generalised beyond the specific area of research, it can be regarded as a building block for a more general knowledge base. Its elevation to a more formal knowledge base that has a much broader application must be the subject of further research. Specifically, an investigation following this research design can be applied on global scale using a larger sample size. This would further strengthen the robustness of the framework and would increase its generalisation. Further, this framework can unlock so called

'comebacks' and 'left outs' on micro-level, which provide the intellectual space for future research (Glaser, 2007). Consequently, the framework provides systematic and complex details, which can be used to underpin further qualitative or quantitative research into specific sites to investigate some of the intricate details of the specific elements.

The analysis of Round II and Round III has shown that a number of respondents struggled to reply to the notion of social impact. The main reason seems that this parameter is a very subjective and hard to quantify. This observation raises a minor concern on the strength of this particular dimension. Therefore, a separate dedicated study is warranted focusing directly on the social impacts that are caused by logistics activities. This can be, in the first instance of a qualitative nature to strengthen and amend the findings of this research, which then might lead to a quantitative application. Further, whilst the study found trends and importance of particular regional effects, it lacks the description of the impacts in absolute terms and quantitative means. Hence, it might be of great interest to actually investigate this category in a separate quantitative study, which than can built a platform to allow ongoing monitoring of the impacts.

A final limitation is that it is a co-evolutionary framework, in which changing one property of a category affects several others, and thus one variable affects the entire system. Whilst the study provided a rich description of the existing interdependencies, it would be presumptuous, however, to claim that all relations are described in-depth or have even been identified. Certainly, the relationships between the categories and sub-categories are a solid theoretical foundation, but due to the size and complexity of the framework, it is understood that the multifaceted interdependencies need further in-depth research. An investigation developing a clear framework that explicitly details all relationships might be of great interest, measuring the actual strengths and importance of the linkages by the means of sophisticated quantitative methods.

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# **Appendix 1**

## **Round II - Interview Information Package**

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Australia

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**VICTORIA  
UNIVERSITY**

**A NEW  
SCHOOL OF  
THOUGHT**

Institute for Logistics and Supply Chain Management  
213 Nicholson Street, Footscray, 3011

## INFORMATION TO PARTICIPANTS

Because of your extensive expertise in the field of Logistics City-Clusters, we would like to invite you to be a participant in our research project "Towards the development of a holistic planning framework for a Logistics City-Cluster."

### Project explanation

---

The ILSCM is carrying out research into the developing concept of a "Logistics City-Cluster." This forms part of the research program of the Institute that has five major subcategories. These are: the contextual framework of Logistics City-Cluster; their infrastructure framework; their information framework; their sustainability framework; and their policy / governance framework.

The purpose of this part of the research is to identify the determinants of Logistics City-Cluster in the context of regional competitiveness and economic development, and investigate its elements and characteristics as an integrated logistics platform. Information received will be compiled and organised into a new knowledge base to allow the generation of a substantive framework. With your assistance, this framework will be grounded in the thinking, actions, and experience of key personnel associated with existing Logistics City-Clusters.

The developed framework is likely to be of significant use in both practical and academic ways. The stakeholders of Logistics City-Clusters such as government development departments or private investors will get a better understanding of the behavioural patterns of (i) resources, service or demand, related and supporting industries, structure and competition towards the (ii) economic, social, and environmental values of Logistics City-Cluster. Consequently, it can be used to support decision making for investments in infrastructure and operational services. Additionally, the potential to improve the quality and effectiveness of Logistics City-Clusters, and therefore possible regional competitiveness, can be exploited.

From the academic perspective, since there is not much knowledge available in the literature, this study will contribute to filling the gap in the understanding of characteristics of Logistic City-Clusters and their relationship towards regional competitiveness and economic development, and provide solid ground work for further investigation and development of the area.

### What will I have to do?

---

Participation in the study will involve approximately 60 minutes in an interview that, with your permission, will be taped. The resulting transcript will be sent to you for possible correction or expansion. We assure you that the audiotape and the interview notes will be kept confidential and will not be able to be linked to you personally. The tape and notes will be destroyed within 5 years of the completion of the project. You can refuse to answer any question or to stop the interview at any time. Essentially your participation poses no risk to you and withdrawing from the study will not result in any negative consequences.

### **What will I gain from participating?**

---

The interviewee will receive a copy of any published outcomes of the study, which contributes towards the understanding of the emergence Logistics City-Cluster concept, based on the experiences of different clusters in Europe, Middle East and the region of Asia-Pacific. These might bear potential to improve quality and effectiveness of your Logistics City-Cluster and can support decision making for future investments. Additionally your organisation will be considered for inclusion in the Institutes future publication: "Logistics City-Clusters of the World" either as a hard copy and/or Internet-Platform.

### **How will the information I give be used?**

---

The information given by the participant will be used by the researcher within the analysing phase to determine the developing characteristics of Logistic City-Clusters. During this phase all references to informants will be removed, thus ensuring confidentiality and anonymity.

### **What are the potential risks of participating in this project?**

---

There are **no** physical, psychological, social or legal risks involved for the participant within this research project.

### **Who is conducting the study?**

---

The ILSCM, an Institute of Victoria University in Melbourne, Australia is conducting this research study.

Principal Investigator: Prof. Dr. Pieter Nagel, Professor and Director, ILSCM - Tel +61-3-9919 6251

Co-investigator: Prof. Dr. James Sillitoe, Office for Postgraduate Research - Tel +61 3 9687 9360

Researcher: Dipl.-Wirt.-Ing. (MSc) Carsten Sengpiehl, Research Officer, ILSCM - Tel +61-3-9919 6265

Any queries about your participation in this project may be directed to the Principal Investigator above. If you have any queries, concerns or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone +61 3 9919 4781.

## Interview Guideline

To facilitate your prior thoughts in preparation for this interview, I take the liberty to present the questions that will form the substance of the interview for your perusal.

### Questions 1

---

In the first section I would like to establish a clear understanding of your perception of the ways in which the term Logistics City-Cluster (LC-C) is currently used. Then I would like to broaden and deepen my understanding of the LC-C concept in following areas: (i) infrastructure and workforce, (ii) services, (iii) demand, (iv) supporting industries, (v) competition and (vi) strategy and competition.

**Question 1-1:** Can you describe in simple terms and in a few words what your conception of a LC-C is?

**Question 1-2:** Can you tell me about the infrastructure and the workforce resources you see as important aspects of your LC-C and describe them?

**Question 1-3:** What are the core services provided by the LC-C to its clients?

**Question 1-4:** Could you provide an insight on the demand conditions of your LC-C?

**Question 1-5:** Can you describe the supplier and related industries within your LC-C?

**Question 1-6:** Can you describe the stakeholder and governance context in which your LC-C has been created and organized?

**Question 1-7:** Can you describe the current condition of regional and international competition in which your LC-C operates?

### Questions 2

---

In the next two questions I would like to investigate your ideas about the effect of external influences on the development of your LC-C.

**Question 2-1:** Can you describe the important political factors influencing the characteristics and elements of your LC-C?

**Question 2-2:** How did the geographical pattern influenced the character of your LC-C?

### Questions 3

---

I would also like your perception of (i) what are the main differences between a LC-C and a gateway cluster (e.g. airport, seaport and inland port) and (ii) whether defining a LC-C as an 'Integrated Logistics Platform' provides an adequate description of this system.

**Question 3-1:** What do you see as being the main differences between an LC-C and a common trade hub or gateway cluster?

**Question 3-2:** Do you think that the definition of an integrated logistics platform is sufficient to define a LC-C, or are there other important elements to be added?

### Questions 4

---

In the last section I would like to establish a clear understanding of the economic, social and environmental values that your LC-C might contribute to the region.

**Question 4-1:** What is your perception with regard to economic values of your LC-C that might contribute to the development of the region that it serves?

**Question 4-2:** Can you describe the social values that your LC-C contributes to the region?

**Question 4-3:** What are the environmental effects your LC-C has towards the region?

## CONSENT FORM

### Information to Participants:

---

The purpose of the research is to identify the emerging determinants of Logistics City-Clusters in the context of its economic, environmental and social regional value. Additionally Logistics City-Clusters will be examined in the context of their physical and intangible elements and as an integrated logistics platform. This identified knowledge base will be the foundation of the substantive theory that has explanatory as well as descriptive expressiveness and is grounded in the thinking, actions, and experiences of the key informants.

Because you are an internationally recognised leading expert in the field of Logistics City-Cluster, we would like to invite you to be part of this study. Participation in the study will involve approximately 60 minutes of your time in an interview that will be taped. A transcript resulting from the audiotape will be produced and sent to you for possible correction or expansion. The audiotape and the interview notes will be kept confidential and will not be able to be linked to you personally. The tape and notes will be destroyed within 5 years of the completion of the project. You can refuse to answer any question or to stop the interview at any time. Essentially your participation poses no risk to you and withdrawing from the study will not result in any negative consequences.

If you have any question about the project or rights as a participant you may contact Prof. Dr. Pieter Nagel via phone +61 3 9919 6251 or E-Mail pieter.nagel@vu.edu.au or Mr. Carsten Sengpiehl via phone +61 3 9919 6265 or E-Mail carsten.sengpiehl@vu.edu.au. Additionally, if you have any queries or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone +61 3 9919 4781

### Certification by Subject

---

In concordance with research ethics of Victoria University, I, \_\_\_\_\_ of \_\_\_\_\_, certify that I voluntarily give my consent to participate in the study "Towards the development of a holistic planning framework for a Logistics City-Cluster" being conducted at the Institute of Logistics and Supply Chain Management as part of the Victoria University.

I certify that the objectives of the study, together with my rights and any possible risks associated with the research project, have been fully explained and that I freely consent to participation in the procedures described in the above paragraph.

I certify that I have had the opportunity to have any questions answered and that I understand that I can refuse to answer any question or to withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Participant	_____	Witness	_____	Investigator	_____
Date	_____	Date	_____	Date	_____

## **VICTORIA UNIVERSITY RESEARCH ETHICS**

The primary role of a Human Research Ethics Committee (HREC) is to protect the welfare and the rights of participants in research, and the primary responsibility of each member is to decide, independently, whether, in his or her opinion, the conduct of each research proposal submitted to the HREC will so protect the participants. The guiding principles in making this decision are those of integrity, respect for persons, beneficence and justice. The National Statement on Ethical Conduct in Research Involving Humans (1999) issued by the National Health and Medical Research Council and endorsed by the Australian Vice-Chancellors' Committee, the Australian Research Council, the Australian Academies of the Humanities, of Science and of Social Sciences provides guidance on the management of such research and the necessary administrative procedures.

### ROLE OF THE HREC

To consider the ethical implications of proposed research projects<sup>1</sup> involving human participants that fall within the jurisdiction of Victoria University, and to certify with respect to those projects whether they satisfy ethical standards and codes in terms of safeguards for the wellbeing of the participants of the proposed research.

To establish and oversee procedures for the appropriate evaluation and certification of all proposals that falls within the jurisdiction of Victoria University for the conduct of research involving human subjects.

To ensure that Victoria University has in place appropriate policies and practices for the administration of research involving human subjects, and to oversee these practices.

To ensure that research projects involving human subjects that falls within the jurisdiction of Victoria University are not conducted without the appropriate approval of the Committee.

To oversee the development and provision of education programs for staff and students of Victoria University on issues relating to the ethical conduct of research involving human subjects.

To regularly report the Committees' decisions to the Research Committee.

## **Appendix 2**

### **Round II – Certification of Accredited Translation**

Inke Sieloff

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---

## Certified Translations

I, Inke Sieloff, declare under penalty of perjury that I understand the German language and the English language and that I hold accreditation from the “**National Accreditation Authority for Translators and Interpreters**” for translation from German to English (NAATI No. 61730).

I declare that, to the best of my knowledge and belief, the translations in the English language of Carsten Sengpiehl PhD-Thesis: “*Towards the development of a holistic planning framework for a Logistics City-Cluster: A multinational modified Delphi-Study*”, have the same meanings as the statements in the German language in the original document, a copy of which I have examined.

The statements relate to the Chapter 5 through 9 inclusive and the translation package consisting of 38 pages which I have duly stamped and signed. This accredited translation can be made available by request from the examiners or University body, either directly through me or Dr. Pieter Nagel.

**Prof. Dr. Pieter Nagel**

**Senior Strategy Advisor - Logistics and Supply Chain Management**

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**Inke Sieloff**

---

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# **Appendix 3**

## **Round III - Survey**

# Survey of the Logistics City-Cluster framework

## Project explanation

---

The Institute for Logistics & Supply Chain Management (ILSCM) is seeking the perceptions of executives with extensive expertise in the field of Logistics City-Cluster (LC-C) from the industrial, government and academic sectors to explore following three issues:

- i. the determinates and elements of a LC-C
- ii. those influential factors affecting the determinates and elements of a LC-C
- iii. the impact of a LC-C upon the region

Based on two earlier stages of this study we have identified a number of propositions for each of these three areas and would like to ask you about the validity of these statements. The information received will be compiled into a substantive framework grounded in the thinking, actions, and experience of key personnel associated with existing LC-C.

The developed model is likely to be of significant use for stakeholders of a LC-C such as government departments, logistics cluster initiatives and for logistics operators. The information on enabling categories will support the stakeholders to appreciate the most important elements and characteristics of a LC-C. The knowledge generated in regards to the influential factors seeks to provide stakeholders with a comprehensive understanding on the relationship and effect of these factors on the enablers. The impact framework for LC-C will provide awareness of the behavioural patterns towards its related regional economy and may provide practitioners with the potential to appreciate the likely outcome regarding the environmental and social impact.

It is intended that the model and its elements can be used as a generic tool-kit that can be transformed or adapted for regional needs to support decision making when developing or modifying existing LC-C. Consequently the potential to improve the quality and effectiveness of LC-C, based on the developed model and knowledge, can be fully exploited.

## What will I have to do?

---

This survey is separated into two sections. 'Section I' will test the determinates and elements of a LC-C and 'Section II', sent out two weeks after, deals with the influential factors and impact categories. Participation in both parts will involve **approximately 90 minutes** each. The questionnaire starts with details about the participants' profile that can be completed electronically in the appropriate text boxes and drop-down list. Then the survey will present generalised representations and conclusions we have developed from the Round II discussions to which you are asked to indicate your degree of approval on a fixed seven level Likert scale. Additional considerations that you might wish to add can be entered into a free text box at the end of particular segments. At the end of the survey you will find a "Print Form" and a "Submit by E-Mail" button.

## Are there any potential risks?

---

There are **no** physical, psychological, social or legal risks involved for the participation within this research project. We assure you that the completed questionnaire will be kept confidential and will not be able to be linked to you personally. The electronic and printed version will be destroyed after 5 years of the completion of the project. Essentially your participation poses no risk to you and withdrawing from the study will not result in any negative consequences.

## Who is conducting the study?

---

The Institute for Logistics & Supply Chain Management, part of Victoria University in Melbourne, Australia is conducting this research study.

Principal Investigator: Prof. Dr. Pieter Nagel, Director of ILSCM - Tel +61-3-9919 6251

Co-investigator: Carsten Sengpiehl [Dipl.-Wirt.-Ing. / MSc] - Tel +61-3-9919 6265

Any queries about your participation in this project may be directed to the Co-investigator Carsten Sengpiehl. If you have any queries, concerns or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone +61 3 9919 4781.

# Profile of Participant

Please complete details electronically by typing in the given text boxes or choosing the appropriate answer in the drop-box.

Position:

Sector:

Years of experience in the sector:

Years of experience in logistics:

## Section I

### Questionnaire Part I: Developing a consensual description of a Logistics City-Cluster

Could you please indicate whether you approve or disapprove each of these definitional descriptions of a LC-C on the scales provided. We have left space for any added comments that you might wish to add regarding these points.

A LC-C must enable trade through suitable gateways that have international, regional and local trade networks.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The combined presence of lower value-add logistics activities and a critical mass of higher logistics value-add activities is necessary for a LC-C.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The integration of supporting activities ( <i>e.g. insurance, banking, leasing or employment agencies</i> ) is an important essence of a LC-C, since these are demanded by the logistics sector.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
A LC-C has various interrelated stakeholders that have as a geographical area a shared competitive position.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The boundary of a LC-C will necessarily involve activities in a larger surrounding area, thus to determine a clear geographical boundary is challenging.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

Comments	<input type="text"/>
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### Questionnaire Part II: The elaborated Logistics City-Cluster framework

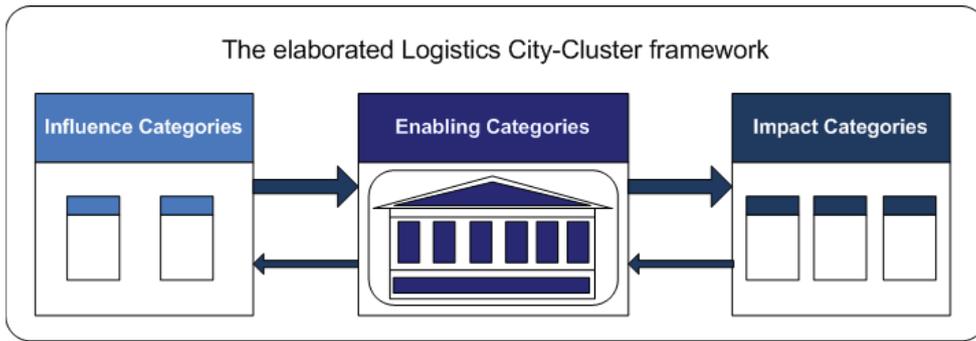
The elaborated framework has been synthesised from the responses of key figures associated with world leading LC-C who were involved with the interview Round II. As a result of these insights, the framework now consists of three main categories; the '**Influence**' category, the '**Enabling**' category and the '**Impact**' category.

**Influence category:** These are the external factors that have an effect on the core determinates and elements of a LC-C and consists of two sub-categories.

**Enabling category:** Is the centre of the model and consists of a logical grouping of eight 'enabling' sub-categories. These are regarded as the core determinates and elements of a LC-C that give both tangible and intangible capacity, and provide the means to its management and development.

**Impact category:** These are the effects that occur within a region due to the existence of a LC-C. This logistics-driven economic system can have both positive and negative impacts on the region and consists of three sub-categories.

In common with balanced theory attributes, these three categories have a linear relationship to each other. The 'External Influence' subcategories have an effect on and are affected by the 'Enabler' subcategories. At the same time the 'Enablers' of the LC-C have an implication on the 'Impact' category and vice versa.

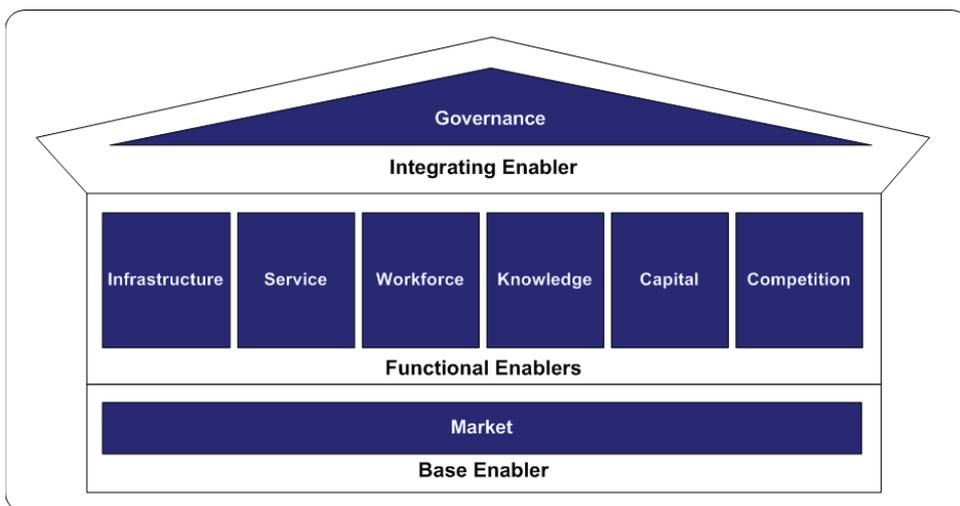


Do you agree with the way in which the LC-C framework has been described?  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Are there any added comments on the way this model has been briefly described and presented that you would like to make?  
 Comments

### Questionnaire Part III: The enabling categories of a Logistics City-Cluster

The eight enabling categories are the centre of the model and are regarded as the core determinates and elements of a LC-C. These categories are further graded into three main sections. First is the **base enabler** consisting of the 'market' category, which creates the demand to establish a logistics-driven system. Second are the **six functional enablers** of a LC-C that are the core determinates of the strategic design. These are 'infrastructure', 'service', 'workforce', 'knowledge', 'capital' and 'competition'. Finally, there is 'governance', which is the **integrating enabler**, aligning and co-ordinating the entire system to generate holsitcs benefits for the LC-C.



Do you agree with the way in which the enabling categories that are identified as being the important determinates and elements of a LC-C, have been drawn together in this model?  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Are there any comments on the way the enabling categories has been briefly described and presented that you would like to make?  
 Comments

## Part III-1: The 'Market' category



The market enabler is the basic demand driver for logistics activities that can be classified into the manufacturing and retail/wholesale sectors. The proximity of demand to a LC-C is defined in terms of *local, regional and international* accessibility. These two central concerns, the segregation into manufacturing and retail/wholesale and their proximity to a LC-C, also take the *size and quality* of the markets into consideration.



### Segmentation of the 'Market' enabler

The market enabler is divided into manufacturing and retail/wholesale sectors because these have different specifications and intimately determine the setup of the functional enablers. Their differences and commonalities should be reflected in the setup of the entire LC-C system.

The market enabler, segmented into the manufacturing and retail/wholesale categories, is the basic demand driver for logistics activities and therefore the necessary foundation of a LC-C.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

### Local, regional and international markets

LC-C connect to local, regional and global markets through trade networks. Proximate markets and LC-C have a symbiotic relationship; initially, logistics activities are enabled by the demand of the local and regional markets, while logistics activities on the other hand attract further market sectors to settle in this region (called agglomeration effects). Increased international connectivity significantly expands market size and is a dominant creator of the regional economic value. The provided functional enablers, especially services and infrastructure, should efficiently integrate dispersed markets.

LC-C should have relationships to various markets segments and locations to buffer the dynamic character of single commodities and reduce reliance on a few economic areas.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

Local and regional markets are an excellent demand platform for logistics operations because they stimulate agglomeration forces.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

International markets play an important role because they increase the market size, thus creating economic value for the LC-C and its region.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

Significant parts of the LC-C (*e.g. infrastructure, services and workforce*) must be suitable for acting as a local, regional and international trade node to efficiently integrate dispersed markets.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

### The role of market size and quality

The size of markets is a key determinant in ensuring that the functional enablers are properly established and administered. For example, economy of scale allows the provision of adequate capital required for developing, maintaining and enhancing infrastructure, and market size can assure the competitive level for logistics activities. Critical size is a determinant of the quality that companies demand of logistics activities, which needs to be reflected at the level of commodities. Further high quality demands on supply chains from the market sectors, forces the functional enablers to meet and maintain high standards.

The size of the markets for a LC-C is a key determinant in ensuring the efficient implementation and performance of the functional enablers.

strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove



Continual pressure by specialist high quality markets will force the logistics sector to:

(i) enhance productivity and efficiency. (ii) speed up innovation. (iii): quickly adopt demanded changes. (iv) have competitive prices.

- |   |   |   |   |
|---|---|---|---|
| <input type="radio"/> strongly approve    |
| <input type="radio"/> approve             | <input type="radio"/> approve             | <input type="radio"/> approve             | <input type="radio"/> approve             |
| <input type="radio"/> somewhat approve    |
| <input type="radio"/> neutral             | <input type="radio"/> neutral             | <input type="radio"/> neutral             | <input type="radio"/> neutral             |
| <input type="radio"/> somewhat disapprove |
| <input type="radio"/> disapprove          | <input type="radio"/> disapprove          | <input type="radio"/> disapprove          | <input type="radio"/> disapprove          |
| <input type="radio"/> strongly disapprove |

Indicators for the evaluation of strength of the market segments are:

(i) its % and growth of the GDP. (iii): its number of leading companies. (iv): its total employment.

- |   |   |   |
|---|---|---|
| <input type="radio"/> strongly approve    | <input type="radio"/> strongly approve    | <input type="radio"/> strongly approve    |
| <input type="radio"/> approve             | <input type="radio"/> approve             | <input type="radio"/> approve             |
| <input type="radio"/> somewhat approve    | <input type="radio"/> somewhat approve    | <input type="radio"/> somewhat approve    |
| <input type="radio"/> neutral             | <input type="radio"/> neutral             | <input type="radio"/> neutral             |
| <input type="radio"/> somewhat disapprove | <input type="radio"/> somewhat disapprove | <input type="radio"/> somewhat disapprove |
| <input type="radio"/> disapprove          | <input type="radio"/> disapprove          | <input type="radio"/> disapprove          |
| <input type="radio"/> strongly disapprove | <input type="radio"/> strongly disapprove | <input type="radio"/> strongly disapprove |

Do you agree with the way in which the determinants of the market enabler have been drawn together in the model?

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

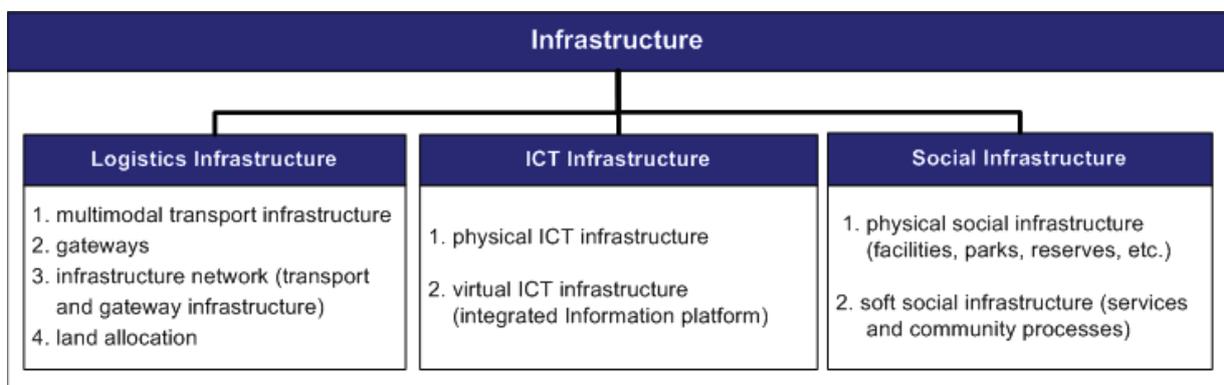
Are there any comments on the way the 'Market' category has been briefly described and presented that you would like to make?

Comments

## Part III-2: The 'Infrastructure' category



The elaborated infrastructure category of a LC-C is structured into three subsections. First, is the "*Logistics Infrastructure*" that takes into consideration the gateways, multimodal transport connectivity and the overall integrated network perspective. Additionally, it deals with the notion of necessary space and land allocation. Second, is the acknowledgement that '*IT-Infrastructure*' is a core sub-category which complements the physical flow of goods. ICT is used as a general term to encompass all physical information technology assets and the necessary integrated information platform which brings together all stakeholders and their related systems. Third is the "*Social Infrastructure*", in the form of both hard (facilities, parks, etc.) and soft (related processes and services) elements, that needs to be provided in response to the perceived needs of a community.



### Logistics infrastructure: The components of transport and gateway infrastructure

LC-C require sufficient multimodal transport and gateway infrastructures tailored for local, regional and international functionalities to enable competitive connectivity. Multi-modal infrastructure is divided into primary infrastructure, enabling high volume international and regional trade, and secondary infrastructure, enabling lower volume regional and local trade. Designing the primary and secondary infrastructure as an integrated networks is of great importance to achieve high efficiencies for a LC-C; however its actual implementation is challenging. Further, any infrastructural developments should be designed to be in harmony with prevailing geographical factors.



To be most efficient, a multimodal transport network must include both primary and secondary modes within a integrated system.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Strategic infrastructure network planning for a LC-C is challenging because of:

(i): diverse responsibilities of authorities and competing priorities of stakeholders.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii): commercial and private incompatibilities.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

LC-C need efficient multimodal transport and gateway infrastructure tailored for local, regional and international use.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Logistics infrastructural development in a LC-C should be designed to be in harmony with prevailing geographical factors.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Logistics infrastructure: The notion of land allocation and innovation

Planning land allocation for the creation and extension of logistics infrastructure is a key element of this enabler. The ideal situation of spatial allocation for logistics infrastructure and its facilities can be seen in an environment that has no other competing urban constructs which is not possible in historical grown LC-C. The scarcity of land, high growth rates and long implementation times can constrain existing logistics infrastructure and inhibit the further growth of LC-C. However, it can also force innovations to increase the utilisation of existing infrastructure capacity.

Competing spatial planning land allocations lead to land scarcity and high prices that inhibits the growth of logistics infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Process and technical innovations associated with the utilisation of logistics infrastructure occur when:

(i): land is scarce.                      (ii): there are high trade growth rates.                      (iii): there are long infrastructure implementation times.

<input type="radio"/> strongly approve	<input type="radio"/> strongly approve	<input type="radio"/> strongly approve
<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve
<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve
<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral
<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove
<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove
<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove

Innovations to increase utilisation of infrastructure need to be complemented by further infrastructure development.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Logistics infrastructure: The quality of transport and gateway infrastructure

The quality of the gateway and transport infrastructure of a LC-C is determined by how robust and reliably it connects to international, regional and local areas. This can be estimated by the quantity and excellence of suitable infrastructure components and the efficiency of the infrastructure determined by the service operators

Quality can be defined by:

(i): quantitative notions, such as size, capacity and amount of infrastructure.                      (ii): qualitative notions, such as density rating, state of the art and maintenance level of infrastructure.                      (iii): efficiencies, such as frequency and number of destinations.

<input type="radio"/> strongly approve	<input type="radio"/> strongly approve	<input type="radio"/> strongly approve
<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve
<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve
<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral
<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove
<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove
<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove

### ICT infrastructure

The provision of physical components (e.g. optical fibre net) is costly and time consuming but is the necessary base of the virtual components. Virtual elements are driven by an integrated information platform connecting all associated stakeholders, enabling seamless information transfer to reduce the workload and increase efficiencies of the operations. Integrated information platforms are commonly implemented in the major gateways of LC-C to manage information exchange, however single solution strategies are sometimes used by global logistics providers who prefer to operate their own software.

ICT infrastrucutre increases the capacity of existing physical logistics infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



Long term planning in collaboration with all stakeholders needs to be undertaken when developing the physical ICT infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

A major component of the virtual infrastructure is an integrated information platform to manage increased complexity of trade.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

It is important to apply service oriented architectures on the integrated information platform to facilitate information flow and data sharing by companies using different softwares.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

**Social infrastructure**

Social infrastructure includes amenities both in physical infrastructure as well as associated services (e.g. kindergartens, schools, housing, public transport and recreational facilities). It complements the functionalities of a LC-C and has a symbiotic relationship with its economic core processes that can be seen as self-sustaining. Such infrastructure needs to be in appropriate proximity or conveniently accessibility to the core activities. The major role of social infrastructure is to attract, develop and keep the workforce. In an economic upturn of the region, the importance of social infrastructure shifts into a more central position for retaining the workforce, whereas in an economic downturn its role becomes more peripheral.

The proximity and accessibility of social infrastructure for a LC-C depends on the nature of the social demand.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Social infrastructure has a strong link to the core trade gateway of a LC-C and its activities.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The level of sophistication of the core activities of a LC-C is strongly tied to the sophistication of the social infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The core role of social infrastructure is to attract, develop and retain sufficient workforce.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The importance of social infrastructure for the workforce varies depending on the economic situation; however it will never completely disappear.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the infrastructure enabler have been drawn together in the model?

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

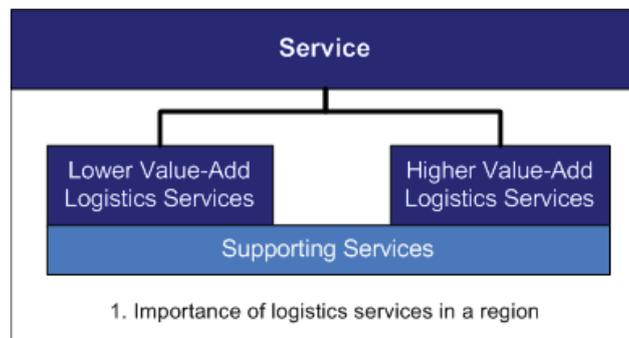
Are there any comments on the way the 'Infrastructure' category has been briefly described and presented that you would like to make?

Comments

**Part III-3:  
The 'Service' category**



In the elaborated concept of a LC-C the term `Services' is taken to refer to the logistics core processes that can be conveniently differentiated in *lower and higher value-add logistics services*. The distinction made between the logistics services is related to the different levels of *value-add functionalities* and take the *importance of logistics for the region* into consideration. Additionally, this category integrates *supporting activities* that are needed to be firmly in place to provide appropriate assistance to the logistics core processes.



**Logistics as a value-add activity**

The perception that the logistics sector has evolved to a competitive catalyst that adds-value to business has resulted from trade liberalisation and shifting of traditional production activities due to increasing world trade. Further within the logistics sector, there seems to be different levels of value-add intensity. Although there is a lack of an undisputable understanding that defines value-add in regards to logistics, it is generally agreed that there are lower logistics value and higher logistics value activities.



Logistics services, which are the core business activities of a LC-C, have evolved from a pure cost factor to a value-adding competitive tool.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The core activities of a LC-C can be divided into two related, but distinct, categories; these being the lower value-add logistics activities and the higher value-add logistics activities.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Lower logistics value-add activities

Lower value-add activities have strong linkages to trade gateways and transport-modes and are seen as transshipment, transport, simple storage and warehouse operations. They trigger and define the character of the higher logistics value services and supporting activities integrated with the logistics chain.

The lower value-add activities are not tailored and one-dimensional but exploit a particular expertise to reduce costs through economy of scale and standardisation.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The lower value-adding logistics activities:

(i): are determined by the nature of trade gateways and transport modes.      (ii): constitute to the basic activities of a LC-C.      (iii): facilitate the character of the higher logistics value services and supporting activities.

- strongly approve  
 approve  
 somewhat approve  
 neutral  
 somewhat disapprove  
 disapprove  
 strongly disapprove

- strongly approve  
 approve  
 somewhat approve  
 neutral  
 somewhat disapprove  
 disapprove  
 strongly disapprove

- strongly approve  
 approve  
 somewhat approve  
 neutral  
 somewhat disapprove  
 disapprove  
 strongly disapprove

### Higher logistics value-add activities

These services include light assembly, customizing, quality control and packaging activities executed in warehouses or distribution centres. They can have a stronger linkage to the import of goods rather than export activities and are located in close proximity to the final market demands to enable quicker response times. Additionally, supply chain management activities (e.g. SCM design and execution) and logistics head office activities are part of this segment. Although they may not necessarily have a direct linkage to a gateway or transport function, there are proximity benefits and other strong relationships to a LC-C.

Higher value-add activities are tailor-made for particular customer demand, have multi-dimensional functions and involve more unique and complex logistics activities that bind different components as a system.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Without the presence of critical mass of higher logistics value-adding activities there would be no LC-C, just a trade platform having basic logistics functions.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Outsourcing of logistics activities

Due to the increased complexity of logistics, its operations within the market sectors are being outsourced to entities that focus on single or multiple logistics services. Advantages of outsourcing are seen as lower costs, reduced capital investment and faster adoption to required changes. However, there are also perceived threats to outsourcing such as losing control of quality and the lack of confidence in maintaining of a high service level.

The outsourcing of logistics services for:

(i) lower value-add functionalities appeared fairly early and was established quickly.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) higher value-add activities has emerged recently and is an increasing trend.

- strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Supporting services

All types of activities demanded by logistics services to enable their efficient operations can be categorised as supporting activities. These consist of a variety of professional business and technical services such as ICT and maintenance activities, research, engineering services, advertising, banking, insurance, leasing and recruitment. Although supporting services are naturally established in close proximity to logistics core activities, it needs to be ensured that they are accessible and compatible. It is also noted that these supporting industries compete with the logistics industry in regards to various functional enablers.



Supporting services must be established in close proximity to the logistics core activities and be accessible and compatible.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Supporting industries compete with the logistics industry in regards to other functional enabler such scarce land, workforce or capital.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The existence of a strong suite of supporting activities, provided at a sophisticated and competitive level, will benefit the logistics sector.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Importance of the core services

The concentration of logistics core services and their supporting activities will provide agglomeration benefits. These agglomeration advantages are further strengthened by robust urban constructs such as social infrastructures and the availability of market segments. To enable a region to understand the importance of the logistics industry, the percentage that the logistics sector contributes to the GDP should be calculated. In addition, because of the limitations of the GDP, other indicators to support this measure should be provided.

A critical mass of logistics and supporting services in combination with appropriate urban constructs will attract further economic activities due to the advantages of agglomeration.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Agglomeration benefits for a LC-C can be:

(i): operational cost reduction due to joint utilisation of capacity.

- strongly approve
- approve
- somewhat approve
- neutral
- somewhat disapprove
- disapprove
- strongly disapprove

(iv) workforce specialisation and pooling effects.

- strongly approve
- approve
- somewhat approve
- neutral
- somewhat disapprove
- disapprove
- strongly disapprove

(iii): faster exchange of knowledge and increased innovation.

- strongly approve
- approve
- somewhat approve
- neutral
- somewhat disapprove
- disapprove
- strongly disapprove

Indicators to demonstrate the strength and development of the logistics sector are the same as for the market segments (% of GDP and its growth rate or employment figures).  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the service enabler have been drawn together in the model?  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

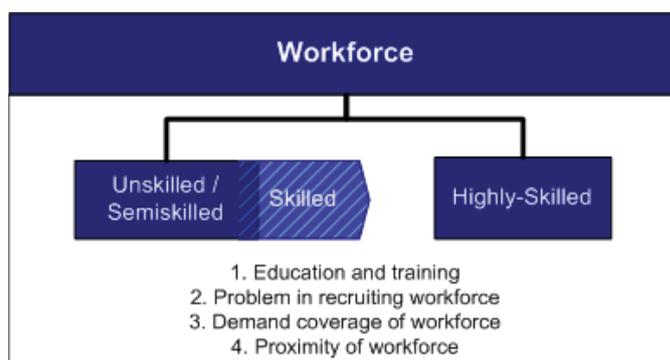
Are there any comments on the way the 'Service' category has been briefly described and presented that you would like to make?

Comments

## Part III-4: The 'Workforce' category



This elaborated enabler is *segmented into the unskilled / semiskilled and highly skilled workforce*. The nature of the classification is based on the *qualification and education of the workforce*. It is generally accepted that a robust workforce in both segments is fundamental. However, it seems that the attraction of workforce in competitive services oriented regions can be quite challenging. The problems of *recruiting appropriate workforce* commonly result in particular *strategies to cover the demand of needed labour*. The final significant characteristic of this enabler deals with the conception of *workforce proximity* to a LC-C.





### Segmentation of the workforce enabler

The workforce can be divided into unskilled/semiskilled and highly skilled segments both of which require education and training which is specifically aligned to their tasks. Currently the major employment group in the logistics industry is the unskilled/semiskilled workforce; however there is an ongoing shift in the labour tradition that is introducing a more skilled workforce that needs specialised education and training. This tendency towards a more skilled and highly skilled segment is driven by technology innovations and increasing complexity; however it is perceived as relatively slow and not as urgent.

The unskilled / semiskilled segment: (i) requires training, such as an apprenticeship or vocational education. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) is the major employment group of the logistics core activities. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The highly skilled workforce needs to receive costly and time consuming tertiary education. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The future trend of the logistics employment segments is towards a more skilled and highly skilled workforce. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The education of the workforce sectors should not be left to chance, but needs to be reviewed regularly and amended if necessary. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### Scarcity of workforce

LC-C co-exist in thriving competitive service-oriented metropolitan areas and have challenges in attracting appropriate workforce. The scarcity in the unskilled/semiskilled sector is associated with the poor reputation of the logistics sector especially when taking a competitive environment of attractive white-collar service jobs into consideration. The scarcity of highly skilled workforce is mainly linked to unattractive quality of life and to the lack of appropriate education. Even if the education for highly skilled workforce is sufficient, but the social infrastructure is not appropriate, recently educated members are likely to leave.

Scarcity in the workforce segments for LC-C exists in competitive service oriented regions. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Scarcity in the unskilled / semiskilled sector is driven by the perception that logistics: (i) is a dirty and physical demanding profession. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) offers low rewards in terms of career development and income. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The lack of highly skilled workforce is in part due to: (i) inappropriate tertiary education. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) insufficient social infrastructure. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(iii) the low reputation of the logistics sector. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### Addressing scarcity of the workforce

There are various strategies to tackle the imbalance of the workforce for a LC-C. The bad image and its negative effect can be addressed by marketing tools, which should be complemented by education and career opportunities. Hence, to reduce immediate lack of workforce and to ensure sustainable workforce in the future, development and operation of education and training facilities for both workforce segments is critical. Further, the provision of appropriate social infrastructure can reduce the attrition of the workforce.

Marketing tools (e.g. school presentation and media coverage) that inform the public about logistics will increase its attractiveness as an employment possibility. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The marketing activities have to be: (i) aligned and linked with tailored training courses and career development opportunities. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) driven in a collaborative manner between the logistics industry and the education provider. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove



The scarcity of workforce can be also reduced by providing:

(i) education facilities for both workforce segments.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) appropriate social infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Proximity of the workforce

The development of a LC-C can be seen as a polycentric urban area (where people can work, shop, relax, and raise a family within a small radius) embedded in a polypolis system (metropolitan area). Appropriate proximity of the workforce to their particular logistics and supporting activities is an advantageous situation. This, however, is influenced by the economic situations and the social infrastructure; consequently it is not always achievable, which can lead to the necessary importation of workforce.

Having the workforce attracted and educated within or in close proximity to LC-C is a commercial and strategic advantage.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

In an economic downturn or areas having lower quality of social infrastructure, it appears that the workforce will accept longer travel distances to work (e.g. international).

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

LC-C that have attracted an educated workforce from distant areas face the threat of losing personnel in better global economic times, since workers' loyalty bond to the region is lower.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the workforce enabler have been drawn together in the model?

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

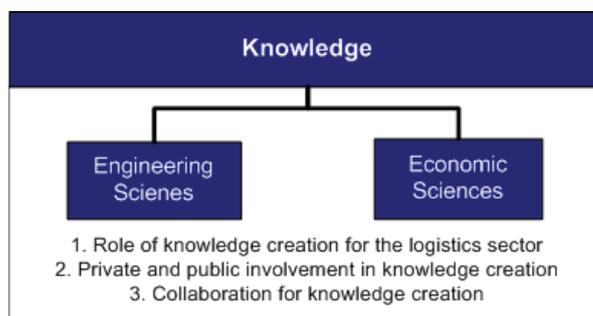
Are there any comments on the way the 'Workforce' category has been briefly described and presented that you would like to make?

Comments

## Part III-5: The 'Knowledge' category



Knowledge is a central concern for LC-C to provide expertise, skills, facts and information to remain competitive. Due to this contribution *the role of knowledge creation* is an critical factor for the logistics sector. It appears that the knowledge required by a modern LC-C is of two general types. First, *engineering science* that relates to hardware development such as warehouse equipment or information technology. Second, there is the sector of *economic sciences* which focus on advanced business models, communication and operational approaches. In regards to the two major fields it seems that the *involvement of the industry and public* in knowledge creation is important. Due to the inter-organisational issue and being a relatively young research area, *collaboration in the innovation sector* should be clearly and deliberately addressed.



### Role of knowledge creation in a LC-C

Despite the perception that logistics innovation is nowadays still somewhat contested and the understanding that service oriented businesses have generally lower innovation intensity, the primacy of continual knowledge generation is of growing importance. Hence, logistics innovation centres focusing on engineering and economic sciences have been established. Although there are clear benefits of knowledge creation, it is perceived that some research outcomes are not practical enough to be immediately implemented.

Continual innovation in the logistics sector is of growing importance because of its competitive nature associated with an increasing complex trade environment.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



Innovation in the field of logistics focuses on the following two areas:

(i) engineering (e.g. equipment, IT).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) economic science (e.g. business models, processes).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The benefits of the knowledge created for the logistics operators are seen in:

<p>(i): cost savings.</p> <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove	<p>(ii): better service quality.</p> <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove	<p>(iii): increased productivity.</p> <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
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### Private involvement in knowledge creation

The interest in innovation for the overall benefit of the logistics chain by a single private stakeholder can be limited, which results from the marginal positive internal impact for individuals (benefits disperse along the supply chain). This situation is exacerbated when taking SMEs into considerations that have limited resources. Nevertheless, single private stakeholders are the main impetus and demand driver for research centres. Further, it seems that major global logistics players who understand the necessity of innovation develop dedicated research departments and support-publicly driven research centres.

The benefits from innovation introduced by a single company are dispersed along the logistics chain which leads to an unequal distribution of the possible benefits.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The logistics industry is the main driver for the development of research platforms by creating the demand for innovation.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Global logistics companies have recently tended to:

(i) develop their own research departments.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) provide financial support for publicly-driven research centres.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Public involvement in knowledge creation

The public sector plays an important role in enabling innovation by supporting the establishment of logistics oriented research institutes or university departments. Also quite common is the direct support of the private sector through public financial stimulation. The establishment of publicly-driven innovation centres generally occurs in close proximity to industry demand, because it enables faster exchange of ideas that stimulates innovations and better outcomes.

Public authorities support research and innovations in the logistics sector by:

(i) providing basic funding for institutes and university departments.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) providing direct industry research grants to logistics operators.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Publicly driven research centres and university departments are strong drivers in the actual process of logistics innovation.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Research centres are located in a close proximity to the demand because of the:

(i) ability to facilitate efficient exchange of ideas that stimulate innovation.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) better implementation of innovations.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Collaboration as a necessity for innovation

The fact that industry and public institutions are both involved in logistics research, underscores the necessity for collaboration. There are various benefits through collaboration that are enabled by shared responsibility because of the combination of individual strengths. Both internal and cross-sector collaboration occurs in LC-C and has resulted in many viable innovations. However, it needs much good will from all stakeholders to share and create knowledge that might not benefit each equally.



Collaboration, combining effort of industry and academics in which each side draws upon their individual strenghts, is beneficial since it:

(i): reduces duplication and scarce resources can be more efficiently deployed.      (ii):increases the acceptance of innovation and practical implementation.      (iii) increases the motivation for future innovations.

<input type="radio"/> strongly approve	<input type="radio"/> strongly approve	<input type="radio"/> strongly approve
<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve
<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve
<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral
<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove
<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove
<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove

Currently, collaboration in the innovation sector is not efficiently handled nor is it satisfactorily developed within a LC-C.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Do you agree with the way in which the determinants of the knowledge enabler have been drawn together in the model?

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

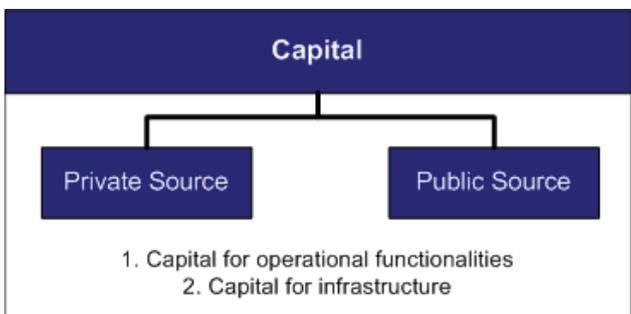
Are there any comments on the way the 'Knowledge' category has been briefly described and presented that you would like to make?

Comments

**Part III-6:  
The 'Capital' category**



In the context of a LC-C, capital is understood as financial power necessary for investment of *essential production factors for logistics companies* (e.g. materials, equipment, land, knowledge or workforce) and the *capital accessibility towards infrastructure*. Both notions are underpin the core role of capital as a functional enabler and underscore the fact that there is a distinction of the 'Capital' enabling category in terms of public (e.g. for infrastructure investment) and private capital (e.g. for operational activities). As a consequence it seems that the enabler can be conveniently segmented into *public and private subcategories* as the two major sources of capital.



**Private and public role related to accessibility of capital**

The 'Capital' category can be differentiated into public and private capital sources and includes the notion of infrastructure as well as logistics operational investments. The public sector is primarily involved in the direct financing of the infrastructure and the setting up of regulations related to capital for logistic operations. More recently the private sector has participated in infrastructure investments directly through Public-Private-Partnerships (PPP) or indirectly by user-pays systems. However, the major role of the private sector is the driver for capital that is needed to finance the elements of the logistics activities.

The core role of public institutions is to enable accessibility to capital associated with:

(i) infrastructure development and maintenance of a LC-C.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) regulations and laws involved with investments in logistics operations.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The private sectors' role in capital accessibility is:

(i) mainly to provide finance for the operational functions of logistics activities.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) partly to support infrastructure investments through PPP and indirectly by user-pays systems.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove



### Accessibility of capital for logistics operational investments

The accessibility of capital for logistics operations is an important factor for the development of a LC-C. Whilst distinctive capital conditions will favour certain types of business activities it will hinder others. Although the accessibility of capital for the logistics sector is not seen as critical as for other sectors, tailored solutions will benefit the logistics industry and have a positive flow on effects to associated services. Despite the indirect influence on the availability and conditions of capital through regulations and laws, governments can provide direct capital through funding, subsidies and interest free loans.

The accessibility of capital is of critical importance, since liquidity is constantly required to enable the operation, investments in facilities, equipment and expansion of business.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Tailor-made solutions favouring the ability and conditions of capital for logistics operations enable sustainable development and success of a LC-C.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Favourable capital conditions in particular logistics activities have positive flow-on effects to further logistics and supporting activities.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### Accessibility of capital for infrastructure investments

Capital for infrastructure investments are commonly provided by the public sector and authorities having good access to capital are able to meet current and future infrastructure needs. However, the endowment of capital for infrastructure development and maintenance is challenged by the fact that capital demand is outweighed by the supply. Consequently, there are resource allocation conflicts between governmental jurisdiction levels and authority departments, which rely on the same source of capital.

Capital for infrastructure (eg. roads and gateways) is a decisive factor for international competitiveness and must be available to meet current and future needs.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The endowment of regions with capital to be used for infrastructure development is challenged by:
(i) the fact that capital demand is outweighed by the capital stock (e.g. increased infrastructure cost).
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) resource allocation conflicts between governmental jurisdiction levels and authorities.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

Increasing costs of infrastructure development and unbalanced capital supply and demand have led to the financial participation of the private sector. Although private involvement through user-pays systems or PPPs is contested it helps to increase the financial scope to enhance infrastructure capacity. Whilst private involvement can have negative implications for competitive positions, since user-pays systems can decrease the attractiveness as a location, the provision of sophisticated infrastructure due to direct allocation of the capital generated from the user can diminish this competitive disadvantage.

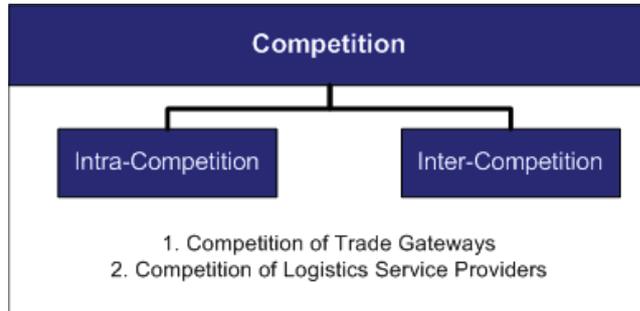
Private involvement in infrastructure development is challenged by the perception that infrastructure is solely the responsibility of the government (e.g low tolerance of user-pay system).
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Private involvement in infrastructure development can have:
(i) negative implications for competitive positioning since tolls means being less attractive for the potential users to establish their business activities and high return assumptions can undermine sustainable upkeeping of the infrastructure.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) positive implications for competitive positioning since quality and efficiency of infrastructure can be transparently linked to capital raised from its increased use.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Are there any comments on the way the 'Capital' category has been briefly described and presented that you would like to make?
Comments <input type="text"/>



## Part III-7: The 'Competition' category

The possibility of having robust competition appears to be an important consideration in the development of LC-C. However, it seems that there is a difference between the competition of organisations located within a LC-C and the competition between different clusters. In this context it is necessary to differentiate the nature of these competitions by discussing the notions of *intra-LC-C competition* and *inter-LC-C competition* separately. In relation to inter competition the *notion of proximity* between clusters will effect the nature of competition. Further it appeared that there is no 'universal competitive strategy' for the logistics sector, which seems especially strong when looking at *traditional gateways services* (e.g. terminal operations) and *other logistics operation* (e.g. freight forwarding, trucking and warehousing).



### Classification of the competition enabler

Whilst competition has positive effects for a LC-C, there is a significant difference between intra and inter LC-C competition. Additionally, because there is no universal competitive strategy in the logistics sector, it is necessary to separately consider the gateway activities and other logistics services for both the intra- as well as inter-competition segments.

It is necessary to distinguish between:

(i) intra- and inter-competition of LC-C.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) the competition of gateways and logistics service operators within the two competition categories.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Intra- and inter-competition have positive effects for a LC-C that are manifested as:

(i) more efficient operations of logistics activities combined with lower competitive prices.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) flexible and fast adoption of new practices demanded by clients resulting in increased innovation.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### LC-C intra-competition: trade gateways

Intra-competition between gateway activities is not always economically advisable due to high investment cost required. Hence, small markets favour oligopolistic or monopolistic gateway structures because investment in multiple transshipment activities might not be sustained and have a negative impact. In situations where it is advisable to reduce the risk of being in a captive gateway situation, some gateway activities can be established and operated by the actual demand creator. However, this strategy does not necessarily mean that the competitive position within a LC-C will increase.

Strong intra-competition between gateways is not always possible and can lead to monopolistic or oligopolistic structure that favour exaggerated price regimes and low quality levels.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Investments in multiple transshipment activities that cannot be sustained due to insufficient volumes will have negative impacts such as:

(i) waste of scarce land.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) loss of capital.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Customers of transshipment activities can independently own and operate transshipment nodes when having an appropriate critical market mass to reduce the risk of being in a captive situation.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Such developments might not, however, stimulate competition when not subject to external pricing and open accessibility.

strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove



### LC-C intra-competition: logistics service provider

Logistics services, other than gateway activities, have lower financial entry barriers regarding initial investment cost and consequently need a smaller critical market size. Therefore, multiple services of the same kind occur and fierce competition takes place. However, it is recognised that the higher the value-add nature of the services are, the more skills are needed which increases the entry barrier.

Logistics activities not purely related to gateway functions have the potential to form a much more competitive environment because:
(i) they have lower entry barriers for production factors (e.g. capital).
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) they require a smaller critical market size.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The entry barriers will increase the higher the value-add nature of the services because more skills are needed.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### LC-C inter-competition: trade gateways

Inter-gateway competition is based on the cargo flow of its trade corridors and their relative efficiency of reaching the intended markets. The efficiency is defined by connectivity costs, time and preferred transportation mode for various commodities. Inter-gateway competition is greater when efficiency factors are comparable and the more standardized the processes of movement along corridors are, since less differentiation can be achieved. Hence, gateways can have superior connectivity in specific corridors for one commodity; but not for others.

The competition of trade gateways:
(i) is associated with their trade corridors and cargo flow of commodities.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) is associated with the efficiency of reaching the intended markets by logistics infrastructure.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The efficiency of reaching intended markets depends on the nature of commodities moved along the trade corridors and is influenced by:
(i) connectivity costs and times.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) preferred transportation mode of commodities.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Inter-gateway competition is greater when:
(i) efficiency factors are comparable between gateways.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) the processes related to the movement along trade corridors are standardized.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### LC-C inter-competition: logistics service providers

The decisive factor for LC-C inter-competition of logistics service operators are economic location advantages such as availability of land at a competitive price, proximity to markets, suitable connectivity and workforce. However, for headquarters and some higher value logistics, which are not necessarily related to the operational logistics functionalities, the main determinant is the social infrastructure.

Inter-competition for logistics services is ultimately decided by possible economic advantages, which are often related to their location.
The location advantages are linked to:
(i) availability of land at a competitive price.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) suitable logistics and social infrastructure.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(iii) proximity to markets.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(iv) workforce availability.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
LC-C have a shared competitive position to other possible locations by having:
(i) a great chance to attract scarce workforce and having high land prices.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) close proximity to markets and very good logistics / social infrastructure.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove



### LC-C inter-competition: the notion of proximity

Inter-competition has a strong relationship to proximity, since the closer cluster are located to each other the greater their competitive behaviour. However, there are factors that can change the importance of proximity and its inter-competitive influence. For example a LC-C that has been in a balanced competitive environment may become more superior for a specific trade corridor with the introduction of new specific regulations impacting trade (e.g. import / export regulations).

The closer LC-C are located to each other, the stronger their inter-competitive behaviour because they compete for common markets and share similar quality of connectivity.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Inter-competition and its relationship to proximity is dynamic and can change due to exogenous political and economic reasons.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the competition enabler have been drawn together in the model?

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

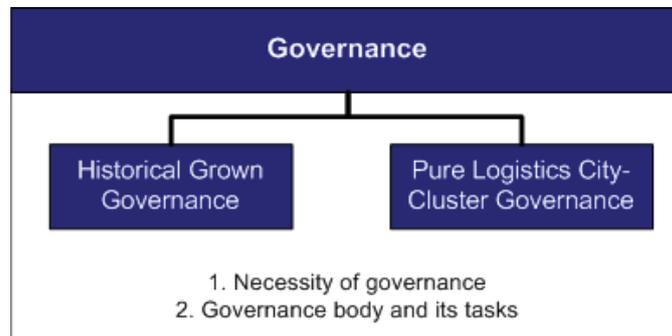
Are there any comments on the way the 'Competition' category has been briefly described and presented that you would like to make?

Comments

## Part III-8: The 'Governance' category



Governance is the integrating enabler that aligns the entire system to generate benefits for the LC-C. It is a mediating platform through which the stakeholders are informed, guided and coordinated in a collaborative manner. Certainly, there are specific understandings of the *necessity of governance*. There is somewhat of an evolution in governance structures that starts with the *historically grown governance models*, to possible pure *LC-C governance model* and its actual practise today. The latter is informing *potential core responsibilities and functions of governance*.



### The necessity of governance

Governance models that co-ordinate all stakeholders and align their activities will create a wider benefit for the system. Hence, governance in a collaborative environment will increase the efficiency and productivity within a LC-C by reducing duplicated and opposing activities as well as lack of accountability for developments.

A collaborative governance system for a LC-C can increase efficiency and create a wider benefit for the system by :

(i) reducing duplicated actions and avoiding opposing activities.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) reducing the effect of unclear division of work and lack of accountability for developments.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iii) aligning the individual objectives of various stakeholders to the goals of the holistic system.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current strategic logistics planning

Although governance is a desirable factor, there is no example of LC-C governance in place. Instead logistics planning is mostly linked to the gateways and in few instances to logistics associations. This pattern of planning is not optimal to increase the shared macro benefits of the cluster, since there is and will continue to be tensions between future planning for the holistic logistics sector and the core objectives of gateway authorities or logistics association, which have weak relationships with other necessary elements of a LC-C.



Governance is not yet a distinctive feature of LC-C, but there are recognisable governance structures such as:

(i) major international gateways and their related authorities associated with the cluster.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) logistics associations that are linked to the higher value-added logistics services.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The pattern of governance, by integrating logistics planning in gateway authorities or associations, is not an optimal model to increase the shared macro benefits, because:

(i) of the strong focus on their core objectives and the weak relationships towards other enablers.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) their planning and legislative powers are predominantly limited within the area of their activity.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### PureLC-C governance and its requirements

One way to ease the tensions created by limited governance is the introduction of a holistic governance body which includes all stakeholders and take their individual strengths into consideration. Hence, the governance body is a platform that facilitates collaboration and leaves formal decision making and developmental processes to the particular stakeholders. A significant condition for a governance structure is the ensurance of the stakeholders commitment and trust. To allow an efficient governance body and to demonstrate compliance, KPIs representing the consensual aims should be in place. Governance systems cannot be standardised and any development of its structure and operations will be dependent upon politics, values, objectives and norms of the region. Despite the possible different characteristics, there are generic tasks that should be considered.

A central decision-making and implementation governance body is presumptuous, since there are too many different and complex aspects driven by various motivations.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

An independent governance body should be a platform or mediator that allows collaboration between all stakeholders of a LC-C.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

A significant condition for the existence of a governance structure is the commitment and trust of all stakeholders, which is seen as:

(i) financial support for the body to operate.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) meaningful participation in discussions and collaborative projects to enhance the LC-C.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The equitable consideration of all stakeholders is important for the existence of a governance body, which is ensured by:

(i) a consensual basis for the aims and operation of the governance body.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) the integration of existing structures and decision-making institutions.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

A governance body cannot be standardised and therefore its operations and objectives need to be suited to the region's culture, political system and values.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The governance body should focus on following tasks:

(i) developing a network platform for all stakeholders to exchange knowledge and ideas.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) aligning the work of the government and the industry to ensure appropriate infrastructure development.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iii) identifying needs of the logistics industry and work with the relevant governments to address these.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iv) marketing the LC-C by addressing its competitive advantage.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(v) striving for international, regional and local interconnectedness for the LC-C.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(vi) striving for knowledge creation in the logistics sector and appropriate education for the workforce.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Are there any comments on the way the 'Governance' category has been briefly described and presented that you would like to make?

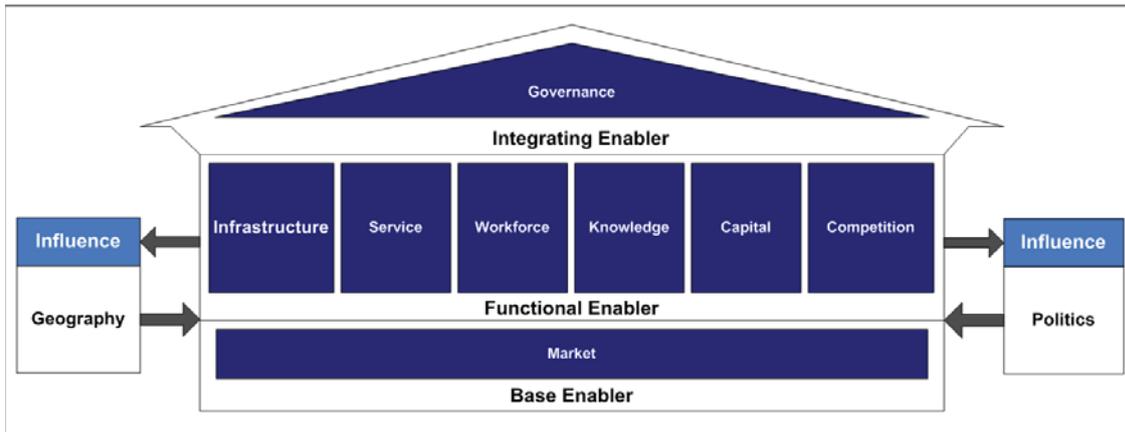
Comments

## Section II

### Questionnaire Part IV: The influence categories of a Logistics City-Cluster



Two categories are the centre of the influence model, which are regarded as the most important factors that affect the determinants of a LC-C. First is the **influence of politics** on the development and conduct of the enablers that can reflect in a positive or challenging way on the LC-C. Second is the **influence of geography** on the strategic design of the LC-C enablers. Geography as an influential factor includes the notion of proximity to markets and topographical conditions. These two influence categories are seen as an imperative for the development and growth of the LC-C system because of their subtle or obvious interdependencies with the enabler.



Do you agree with the way in which the two influence categories, that respondents have identified as being the core factors affecting the enablers of a LC-C, have been drawn together in this model?

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

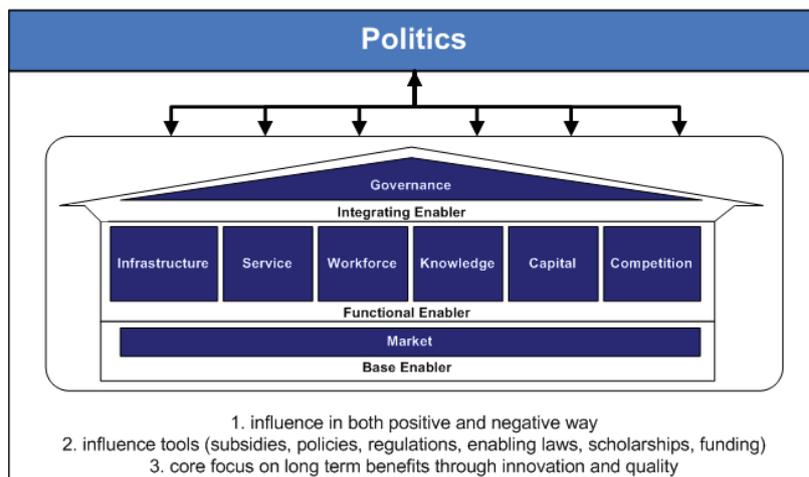
Are there any comments on the way the influence categories have been briefly described and presented that you would like to make?

Comments

### Part IV-1: The 'Influence of Politics' on the enablers



The role of governments is seen as a significant influential factor (obvious, subtle or reflexive) on all existing enablers. Authorities can influence the development of the LC-C in a **positive way**. However, a LC-C will not be enhanced or sustained in the long term if private industry is not encouraged to advance or increase efficiency. Thus, **negative effects** occur if there is long term and inappropriate government assistance which can create a climate of dependency. Political **influential tools**, which must also take into account the needs and well-being of other constituents in the administered area, can include subsidies, policies, regulations, enabling laws, scholarships as well as direct funding. It can be concluded that a **long term strategic focus of politics on the logistics sector** is vital to implement the right regional support tools in the respective enablers.





### Influence on market size and quality

Size and quality of the markets are the major areas of political influence. The government can stimulate growth in market size by acting as an 'early demand creator' and by connecting the LC-C to regional and international locations to increase its catchments area. To enhance market quality, authorities can link the LC-C with market companies that demand high logistics standards. Additionally, market quality can be influenced by regulations that have an enhancing effect on the quality level of companies.

Political influence is used to increase market size by acting as an early demand source to stimulate development and establishment of new logistics strategies or technologies.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Government authorities increase the catchment area of LC-C by linking it to regional and international locations through :

(i) favourable trade policies and import / export regulations.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) specialised trade zoning.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Political influence encourages the integration of market companies that have sophisticated logistics demand by legislating favourable regulations in addition to financial incentives.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

High quality logistics demand is supported by political means through regulations that have direct effects on the market quality standards (e.g. ISO) and enable access to standardized quality information about logistics services.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Influence on quality and quantity of infrastructure

Political groups can ease the development of physical infrastructure through land use planning schemes. This can initially include a comprehensive spatial infrastructure plan that provides an integrated transport network approach (gateways, primary and secondary modes) and secondly an effective planning scheme for successful implementation of integrated information platforms. However, the most powerful condition of coordinating authorities to enable massive infrastructure is perceived as compulsory acquisition of land. Additionally, authorities can enable infrastructure accessibility (logistics, ICT and social) for all stakeholders.

Government authorities:

(i) favour the development of appropriate infrastructure by land use planning regulation.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) apply compulsory acquisition of land in challenging situations.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iii) enable open access of infrastructure to many different stakeholders through equitable regulations.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iv) provide the appropriate social infrastructure that aligns with the workforce requirements.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

A long term spatial allocation framework for physical infrastructure development that integrates the transport network perspective is currently addressed by political planners to ensure that future demand levels are met.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Politicians are the initiators and the driving force for an effective strategy to successfully implement an integrated information platform for the LC-C.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Influence on the services enabler

Political influence towards the service enabler is related to the attraction of quality logistics activities and supporting services by facilitating lower administrative and legal burdens, providing public funding or introducing favourable tax requirements. Additionally, land use regulations that allow the settlement of logistics or supporting services in a planned manner are the focus of government planners. Whilst authorities can also decide to be co-owner of an activity, the strongest political influence towards services is if they regulate or operate overseeing functionalities (e.g. customs).

To attract and integrate quality logistics activities and supporting services, authorities:

(i) lower legal and administrative barriers.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) provide direct subsidies (e.g. cash transfers).

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



(iii) provide indirect subsidies (e.g. provision of infrastructure, tax reduction).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(iv) apply favourable land use regulations to bring these in close proximity.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Potential government co-ownership of service providers is considered in order to:

(i) support start ups and implement new technology or regulatory standards.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) ensure critical logistics functions (e.g. trade gateways).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Public regulated and operated activities are currently carried out efficiently to avoid compromising the entire supply chain and hence the LC-C as system.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

**Influence on the workforce enabler**

The main influence of the government is to ensure appropriate quantity and quality of the workforce. To avoid workforce scarcity; governments can intervene by marketing campaigns, skilled immigration regulations and providing suitable social infrastructure. Authorities can also develop logistics education centres and frameworks, appropriate reward system for educators, education funding and tax deduction of fees to achieve high workforce standards. An important influential factor, however, is the interaction with the private sector to ensure that demanded workforce qualifications are known, updated and integrated.

Government authorities interact with the private sector to ensure strategies aimed to guarantee an appropriate size of the labour market that has the right technical and professional skills.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Government authorities in LC-C ensure the development of high quality education standards by:

(i) funding state-of-the-art logistics education centres and ensuring excellent educators.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) overseeing the regular update of logistic educational frameworks and curriculum.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(iii) enabling tax deduction for private educational activities.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

If a skilled and motivated workforce is not accessible, governments support the logistics industry sector by:

(i) introducing regulations that allow skilled immigration.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) introducing marketing campaigns to attract potential employees.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(iii) providing appropriate social infrastructure to attract workforce.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(iv) providing suitable education facilities and tailored course.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

**Influence on the knowledge enabler**

Stimulation and ongoing support of innovation is a key area for government intervention. The focus can be on the creation and assistance of research platforms through basic funding, research grants or scholarships. Authorities can also support knowledge creation within the private logistics sector through leverage strategies to achieve a better collaborative environment between public research centres and industry (e.g. joint research projects) and by removing administrative or legal barriers.

Governments support the establishment of logistics research institutes and university research departments through:

(i): basic funding.	(ii): research grants.	(iii): scholarships.	(iv) favourable innovation policies.
<input type="radio"/> strongly approve			
<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve
<input type="radio"/> somewhat approve			
<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral
<input type="radio"/> somewhat disapprove			
<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove
<input type="radio"/> strongly disapprove			



Governments stimulate innovation and its implementation within the private logistics sector by:

- (i) increasing collaboration with public research centres through the removal of legal barriers and provision of co-funding.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (ii) directly supporting companies through grants and tax deduction possibilities.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (iii) establishing innovation centres in close proximity to logistics activities.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Influence on the capital enabler

Infrastructure is critical for a LC-C and sufficient capital should be allocated by authorities for its development, maintenance and enhancement. Although the involvement of private capital through PPP or user-pays system is increasing, it appears that this does not diminish the leading role of governments. Authorities can also influence the accessibility of capital needed by the logistics industry through regulations, interest rates and positioning towards foreign capital. These can either encourage or hinder the growth of the logistics industry. Moreover, direct and indirect capital advantages can be provided to logistics businesses.

Governments ensure that capital for infrastructure development and maintenance is available to meet current and future needs.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Availability of capital from the private sector for infrastructure development has not diminished governments influence because:  
(i): political groups have a leading role in PPP arrangements.   (ii): government authorities regulate user-pays systems.   (iii) governments ensure that private generated funds are dedicated for infrastructure.

- |   |   |   |
|---|---|---|
| <input type="radio"/> strongly approve    | <input type="radio"/> strongly approve    | <input type="radio"/> strongly approve    |
| <input type="radio"/> approve             | <input type="radio"/> approve             | <input type="radio"/> approve             |
| <input type="radio"/> somewhat approve    | <input type="radio"/> somewhat approve    | <input type="radio"/> somewhat approve    |
| <input type="radio"/> neutral             | <input type="radio"/> neutral             | <input type="radio"/> neutral             |
| <input type="radio"/> somewhat disapprove | <input type="radio"/> somewhat disapprove | <input type="radio"/> somewhat disapprove |
| <input type="radio"/> disapprove          | <input type="radio"/> disapprove          | <input type="radio"/> disapprove          |
| <input type="radio"/> strongly disapprove | <input type="radio"/> strongly disapprove | <input type="radio"/> strongly disapprove |

Governments favoure the availability of capital for the logistics activities through:

- (i) determining interest rates and the amount of capital that is accessible through the central banks.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (ii) favourable regulations and support for attracting foreign capital.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Influence on the competition enabler

Governments' objectives are the stimulation of intra- and inter-competition for LC-C to increase efficiencies and avoid over pricing. When LC-C are associated with sufficient market sizes, the reduction of entry barriers and regulation to prevent power concentration can be strategies to stimulate competition. In case of small markets that have sufficient inter-competition, authorities can lower the critical demand. Stringent political strategies such as price guidelines or access regulations can be necessary when market demand is too small and inter-competition is not sufficient.

Government authorities stimulate competition in an environment that is sufficient to host many different logistics providers by:

- (i): reducing legal and administrative entry barriers.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (ii): preventing power concentrations through regulations (e.g. anti-trust).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (iii) providing direct subsidies and indirect subsidies.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Political authorities assure competition in an environment of small demand but sufficient inter-competition by:

- (i) lowering the critical mass based on demand levels (e.g. infrastructure provision).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (ii) providing direct subsidies and indirect subsidies.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

When demand is small and inter-competition is not sufficient, political authorities avoid negative effects of monopolistic behaviour by:

- (i) regulating and monitoring prices.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove
- (ii) enforcing open access regulations.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove



## Influence on governance

Governments are a natural precursor for the creation of a collaborative governance system that can be manifested through a strong determination and financial stimulation. This bridging of all relevant stakeholders supports the consequent exchange of knowledge for the current and future LC-C development. It leads to the development and continuous modification of better overall policies, regulations, laws as well as direct and indirect support for the enablers. The balance of the public and private sector within a governance system will determine the political influence on the enabler as part of the governance system.

Governments are the natural initiator of creating a collaborative governance system by:

(i) having a strong and determined political will.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) providing targeted financial stimulation.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Political influence to bridge all relevant stakeholders leads to the development and continuous modification of better overall governmental tools (e.g. regulation and policies) for the enablers.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

## General notions on political influence

There are also general conclusions resulting from the first two iterations of this study that are associated with the effect of political influence upon a LC-C. Please indicated you approval or disapproval of the following statements.

Implementing strategies developed by other nations might inappropriate, since each LC-C and its associated political system have their own regional and cultural characteristics.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Inappropriate government assistance can take developmental impetus from the logistics industry and creates a climate of dependency.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Long term development plans for education, infrastructure and innovation are more sustainable and effective than short term subsidies for logistics service operators.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the political influence category have been drawn together in the model?

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

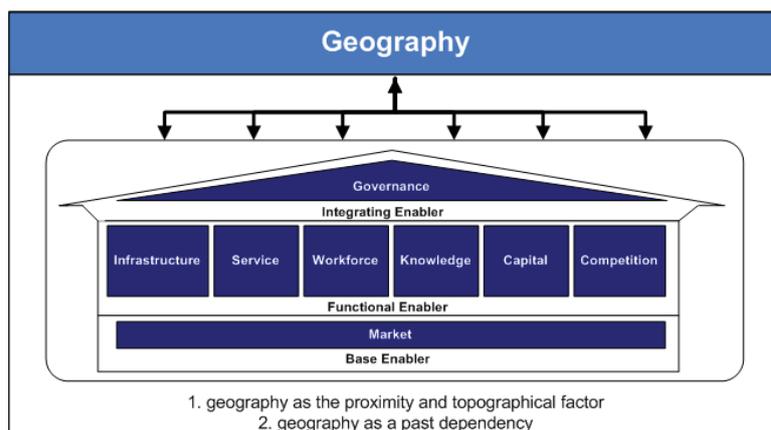
Are there any comments on the way the 'Political Influence' category has been described and presented that you would like to make?

Comments

## Part IV-2: The 'Influence of Geography' on the enablers



The development of a LC-C cannot be fully evaluated without relating them to geographical circumstances, since these influence the enablers both in obvious and subtle ways. The **proximity and the topographic conditions relating to the accessibility to markets** seem to be the core influential factors in the setup of a LC-C. Further, geography has an obvious **affect upon the infrastructure and service enabler**, which then **subsequently influences the other functional enablers**, such as the workforce, due to their interdependency. The final observation was that geographical factors have a dynamic character; therefore LC-C can at some stage move beyond the constrains of the basic geographical factors (*past dependent character of geography*).





## Geography as an accessibility factor to the markets

The effectiveness of LC-C in connecting with markets depends largely on the geographic circumstances of the location, with respect to proximity and topographical barriers. Hence, the closer the markets and the more favourable the topographical conditions are, the more beneficial this can be for a LC-C.

Proximity and topographic conditions of LC-C related to the accessibility to markets are core influential factors.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Proximity to markets and favourable topographical conditions will enable logistics agglomeration benefits that include:
(i) lower logistics operational cost related to accessing the demand.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) reduced cost for infrastructure development and maintenance.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(iii) increased reliability and faster response time for logistics operations.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

## Proximity to the markets

Geographical proximity to markets appeared as an important factor for a LC-C. However, the gravity-centre of market segments can differ and further proximity is determined at the level of commodities that have distinct interpretations based upon their particular needs. Geographical proximity also depends on management strategies that favour particular characteristics and locations of logistics activities. Hence, there can be diverse gravity points.

A LC-C should be located in the geographical gravity point of market segments.		
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove		
The notion of proximity is affected by:		
(i): the dispersed location of the retail/wholesale and manufacturing markets.	(ii): the specific logistics demands of the market segments' commodities.	(iii) different logistics management strategies.
<input type="radio"/> strongly approve	<input type="radio"/> strongly approve	<input type="radio"/> strongly approve
<input type="radio"/> approve	<input type="radio"/> approve	<input type="radio"/> approve
<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve	<input type="radio"/> somewhat approve
<input type="radio"/> neutral	<input type="radio"/> neutral	<input type="radio"/> neutral
<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove	<input type="radio"/> somewhat disapprove
<input type="radio"/> disapprove	<input type="radio"/> disapprove	<input type="radio"/> disapprove
<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove	<input type="radio"/> strongly disapprove

## Topographical characteristics and conditions as an accessibility factor

The topographical conditions favour and predefine logistics accessibility to local, regional and international markets in terms of time, cost, and reliability. Moreover, in many instances this will have initially led to the establishment of trade gateways. Based on the efficient distribution and movement of goods enabled by topographically favoured transport modes, established basic trade gateways can evolve into more sophisticated LC-C.

Topographical characteristics and conditions can determine:
(i) the primary and secondary connectivity infrastructure to the local, regional and global markets.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) the core trade gateway and the dominant transport mode of a LC-C.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
Favourable topographical conditions for particular transport modes increases the development of sophisticated logistics infrastructures that can evolve into a LC-C.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

## Geography and its influence on the functional enablers

The accessibility to the markets affected by proximity and topographical conditions strongly predefine the core transport mode and subsequently characterize the nature of associated trade gateways. Hence, geography has a direct effect upon the functional enabler of infrastructure, logistics activities and supporting services. In a subtle way, this then influences the other functional enablers through their mutual inter-relationships.

Geographical conditions strongly influence the character of the infrastructure (e.g seaport) and service enabler (e.g. maritime logistics services) of a LC-C.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove



Due to the inter-relationship of the enabling categories, geographical influences on the infrastructure and service affects the other functional enablers in a subtle way (e.g. stevedores, maritime logistics research or financial institution).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

LC-C have a unique setup of the functional enablers as a result of their particular geographical factors.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Geography a past dependent factor

Geographical factors are dynamic and tend to be historically dependent. Whilst there are geographical conditions that initially informed the characteristics of the functional enablers, they are no longer the core driver. At some stage a modern LC-C will move beyond historical developments, by increasing the quality and quantity of the functional enabler as a system. The sophistication of the enablers tends to be the key for sustainable growth; however geographical factors still can be a strong asset.

The importance of favourable geographical factors can increase or diminish due to their dynamic character that is driven by technical innovations and socio-economic changes.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Advantages of geographical factors can lead to an increase in the quality and quantity of the enablers, which is referred to as a 'self reinforcing cycle'.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Although geographical advantages can diminish, the LC-C are likely to develop further because of the increased sophisticated attributes of the functional enablers (self reinforcing cycle and agglomeration forces).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the geographical influence category have been drawn together in the model?

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

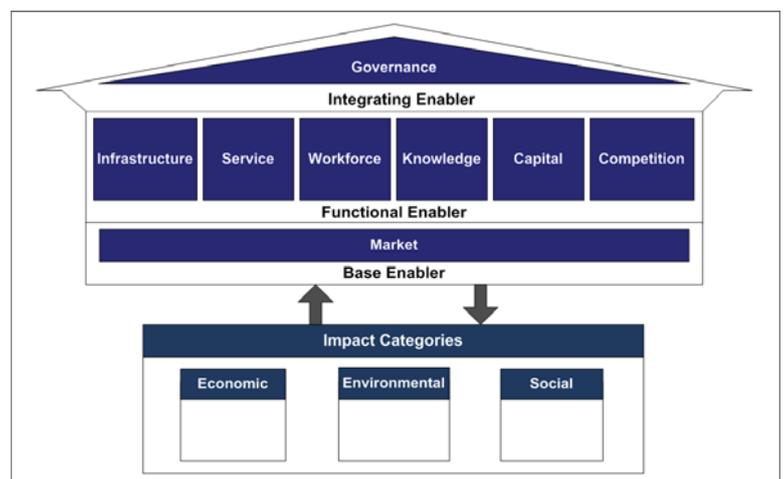
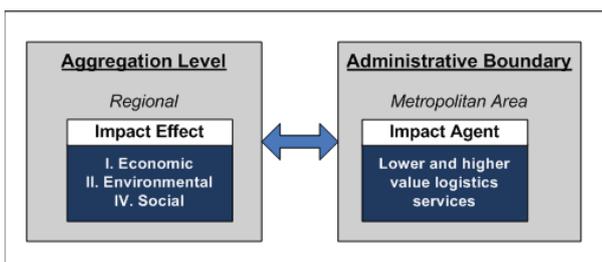
Are there any comments on the way the 'Geography Influence' category has been described and presented that you would like to make?

Comments

## Questionnaire Part V: The impact categories of a Logistics City-Clusters



When examining the impact of a LC-C, the so called impact agents and effects need be defined to ensure a valid data collection and analysis. In regards to **impact agents**, these refer to the **the higher and lower value logistics services**. They need to be located in a particular administrative boundary and since logistics activities are widely dispersed, it was decided that the metropolitan boundary of LC-C is suitable for this investigation. The **impact effects** reflect the overriding 'scope' of a LC-C to be a sustainable global logistics hub and are categorised as the **economic, environmental and social categories**. Importantly the impact effects need to be linked to a particular aggregation level. For this qualitative examination, the focus was set on the understanding of possible impacts on a regional level. Hence the impact categories details the cognisance of the sustainable triple bottom line approach by addressing the economic, environmental and social changes and effects on the surrounding region due to the existence logistics activities.



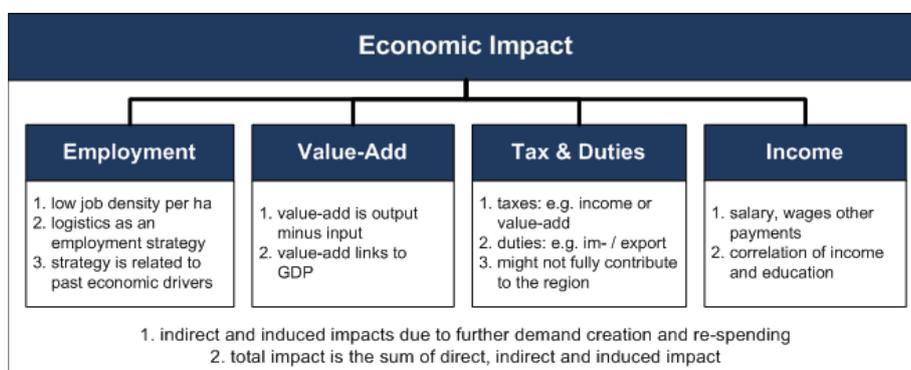
Do you agree with the way in which the three impact categories have been drawn together in this model?  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Are there any comments on the way the impact categories have been briefly described and presented that you would like to make?  
 Comments

## Part V-1: The 'Economic Impact' category of a Logistics City-Cluster



The observed economic impacts of the logistics activities on the surrounding region are classified in four categories. First is the **creation of employment** opportunities that logistics activities create for the region. Second is the **value-add to goods** passing through the area, which is seen as the output minus the intermediate inputs. The value-add can be directly associated with the GDP to facilitate an understanding of the impact on regional economic growth. The third sub-category contains the **revenue streams for governments due to tax and duties** associated with the logistics activities, which can be allocated for the enhancement of the enablers. Fourth is the level of **income for the workforce** that is seen as salaries and wages to employees. The core economic impact here is that the income induces flow-on effects that result in further value, jobs, tax and income, since the income will be partly spent on regional goods and services.



### The pre-eminence of employment opportunities

Increased employment opportunities for a region represents a key economic impact of a LC-C. Although the observed job density per hectare is not very high compared to other commercial and industrial sectors, the logistics sector is seen as an innovative employment strategy that is amplified by changing business practices. This employment strategy can be related to the past economic core characteristics of the region such as the dominant employment sector or existing trade gateways. Beside direct employment impact there are indirect and induced job opportunities that are linked to logistics activities.

The sum of total employment resulting from the logistics sector per hectare is lower than in many other industry and commerce sectors.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

LC-C are an innovative employment strategy used to tackle declining employment in other industrial sectors because of the increased importance of logistics.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The compensation of job losses in other sectors is more likely to be addressed by a LC-C if following factors exist:

(i): a large blue collar oriented employment structure. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove	(ii): trade gateways and basic logistics activities. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove	(iii): land availability and supporting geographical factors. <input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
---	--	---

The LC-C not only creates direct employment in its core sectors but also indirect in the supporting industry resulting from logistics demand.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



### The importance of value-add for the region

Logistics activities increase the value-add factor in the region and is perceived as the output (created in the region) minus the intermediate inputs (created in other regions). The value-add measure can be associated with the regional GDP, which indicates the importance of logistics and can facilitate its impact on regional economic growth. This pragmatic understanding can be used to support decision-making processes to restrain or stimulate the logistics sector. Beyond the initial round of increasing value-add by the logistics services, there are also indirect and induced value-creation effects.

The share of value-add created by logistics activities in the region hosting a LC-C is much higher than the national average.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The value-add of the logistics sector can be linked to the GDP to measure its importance and growth rate in the region.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
LC-C not only creates direct value-add due to its core sectors, but also indirect value-add from the supporting services demanded by the logistics industry.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove

### Tax and duties as revenue originators for governments

The revenue streams for governments due to tax and duties created by logistics activities have an important economic impact. Here taxes are understood as trade, value-added or income tax, whilst duties are non-tax payments for example income from the usage of infrastructure. Additionally, there are indirect and induced revenue effects such as the trade tax of the supporting activities. However, these revenue streams might not fully contribute the region itself, since these can be allocated at a higher government level.

Logistics generates revenue for the authorities in form of tax and duties that can be allocated for the enhancement of the enablers.																																
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove																																
The most important taxes of the logistics sector are:																																
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(ii) user-pays infrastructure.																																
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The LC-C not only generates direct revenue through the logistics activities but also indirect from supporting services demanded by the logistics industry.																																
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The contribution and allocation of the tax and duties for the originating region depends on the nature of the revenue source itself and the governmental system to which the region is bound.																																
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### Generating income for the workforce

Income as an economic impact on a region can be seen as salaries, wages and any other payments to employees working in logistics. It seems, after correlating the needed education and the income, that personnel in the logistics profession are fairly well paid. The core economic impact here is that the income induces flow-on effects that result in further value, jobs, tax and income, since the payments received by employees will be partly spent on regional goods and services.

The generation of income as an economic impact relates to salary and wages of the employed workforce in the logistics sector.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The income level for the logistics sector is higher than in other service industry sectors for corresponding educational levels.
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The core economic notion of income is that it creates additional value, employment, tax and income in the region.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The higher the income of the logistics sector and the more it is spent in the region, the greater the opportunity for the region to grow.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the economic impact category have been drawn together in the model?  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

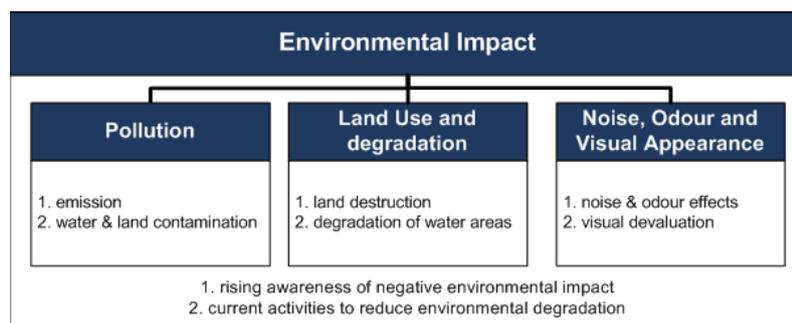
Are there any comments on the way the 'Economic Impact' category has been described and presented that you would like to make?

Comments

## Part V-2: The 'Environmental Impact' category of a Logistics City-Cluster



The environmental impact generated by a LC-C can be segmented into three major categories. First of all there is **pollution** and waste disposal into the atmosphere, water and land surface that causes hazards to the surrounding environment. Second the **degradation of surface areas** due to its utilisation by logistics activities that therefore reduce natural habitats. The third aspect concerns the negative impact of related **odour, noise and visual appearance**, induced by traditional logistics services. Whilst the environmental issues have long been subsumed by macro- and micro economic imperatives, there are increasing strategies emerging at public and industry level aiming to reduce the negative effects. Hence, the rising **awareness of the challenging situation** of the environment occur and appropriate **activities to reduce the degradation of the environment** are initiated.



### The challenge of pollution

Pollution is the core environmental challenge of a LC-C. CO<sub>2</sub> emissions are the most concerning source and are mainly caused by transport activities. When comparing transport modes and their CO<sub>2</sub> emissions per tonne-kilometres, road transport and aviation appeared to be the key polluter. However, for nitrogen oxides and sulphur dioxide emission the maritime sector is more important. There is also pollution that refers to land and water contaminations, which originate through transport and transshipment activities and appear mainly along the trade corridors and gateways. Additionally, pollution can arise from waste disposal and maintenance of particular transport and transshipment equipment, and the development of logistics infrastructure.

CO<sub>2</sub> emissions:

(i) induced by transport activities are the core factor of pollution concern for a LC-C.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) have to be correlated to tonne kilometre when comparing transport modes.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iii) created by the road transport sector is the major source of pollution in any LC-C.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Maritime oriented LC-C have a high amount of sulphur and nitrogen oxide emissions.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Significant land and water contaminations occur along trade gateways and corridors and are caused by:

(i) transport and transshipment activities (e.g. oil and fuel spills, sludge spills, battery acid, waste disposal).  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) the development and maintenance of logistics infrastructure.  
 strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



### Land use and its degradation

Land degradation relates to the massive allotment for gateways and transport infrastructure that replace flora and fauna with concrete, steel and asphalt. The clearances of the land for the infrastructure destroy natural green habitats that can be lost on a long term basis. There is not only the degradation of land surface but also of water areas, which are associated with maritime-based LC-C. First, there can be land reclamation from the sea, and secondly particular infrastructure components need regularly dredging, which can lead to adverse environmental effects.

The clearance of the land surface for gateways and transport infrastructure causes degradation of the natural habitat and its flora and fauna by replacing it with concrete, steel and asphalt.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The degradation of water areas and its eco-systems:
(i) occur through land reclamation from the sea for gateway activities and regularly dredging to enable sufficient trade accessibility.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) can lead to adverse environmental effects (oxygen shortfall, lost spawning grounds) that cause decline of maritime flora and fauna.
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The destruction of the land and water areas is long term and can be irrecoverable.
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### The effects of noise, odour and visual appearance

The third sub-category is the combination of the negative effects of noise, odour and visual distraction arising from logistics activities. Odour is primarily generated by pollution effects that occur during logistics operations and during the development of logistics infrastructures. Noise arises when powerful mechanical equipment is used during logistics infrastructure development and from continual logistics operations. The negative impact on visual appearance largely results from massive logistics infrastructure and logistics operational functions.

Noise, odour and visual appearance don't have such significant environmental impact compared to the first two sub-categories.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The negative impact of odour is mainly associated with transport activities and the development/maintenance of logistics infrastructure.
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The negative impact from noise originates from logistics activities (e.g. trucks, container transshipment, warehouse gates) and the development / maintenance of logistics infrastructure.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
The effect on visual appearance primarily results from massive logistics infrastructure and exists on a minor level for logistics activities (e.g. application of floodlights).
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### Rising awareness of negative environmental impact: Outweighing

Clearly core activities of a LC-C have a hazardous environmental impact; however it seems that there are two core forces that mitigates against the reduction of these negative effects. First this can be macro economic forces, such as pressure in employment possibilities for the region. Second there are micro business forces such as the lack of earmarked financial resources and the lack of perception of internal benefits.

On a macro level, economic effects (e.g. creation of employment) can outweigh concerns for hazardous environmental impacts.
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On a logistics company micro level, obstacles for environmental-friendly behaviour are:
(i) the lack of financial and human resources.
<input type="radio"/> strongly approve <input type="radio"/> approve <input type="radio"/> somewhat approve <input type="radio"/> neutral <input type="radio"/> somewhat disapprove <input type="radio"/> disapprove <input type="radio"/> strongly disapprove
(ii) the lack of perceived internal benefits due to inappropriate environmental financial quantification.
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### Rising awareness of negative environmental impact: External and internal motivations

Despite those forces, environmentally friendly behaviour has gained importance through external and internal pressures. External reasons result from government enforced regulations and from the general public and the logistics-customer demand. Internal reasons are driven by the motivation of logistics companies and reflect the need of increased productivity and cost reduction that can have positive environmental effects. Notwithstanding the apparent conflict of economic principles and the need to reduce environmental degradation, the induced or forced trend of eco-friendly behaviour is linked to direct and indirect benefits.



The internal reasons reflect the need of increased productivity and cost reduction of logistics firms which can have positive environmental side effects (e.g. driver training).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The external reasons for the increasing awareness and reduction of the negative environmental effects are:

(i) governmental laws and regulations that are enforced by taxes and possible fines.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) pressure from the markets segments and social interest groups due to possible loss of business.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Eco-friendly behaviour induced by the two factors are linked to forced:

(i) direct benefits (e.g. cost savings on operational level, lower taxes and duties).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) indirect benefits (e.g. increased business opportunity, attracting quality workforce).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current activities to reduce environmental degradation

Increasing awareness towards environmental friendly behaviour results in two interdependent approaches to reduce the negative impact. These are the implementation of new logistics strategies or operational processes and the introduction of new environmentally- friendly technologies.

The reduction of the negative environmental impact is approached by two interdependent notions:

(i) logistics strategies and operational processes (e.g. multi-modal transport).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) environmental friendly technologies (e.g. fuel efficient engines).

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current activities to reduce environmental degradation: Pollution - Macro Perspective

Road transport is a core environmental concern and multimodal transport emerged as a macro strategy to lower the CO<sub>2</sub> emission per tonne kilometre. Implementing multimodality however leads to restructuring of supply chains, since sourcing and distribution the remit of transport, needs to be adjusted. Important is also the consolidation of freight to achieve the necessary economic mass. If multimodality is introduced to reduce the emission, its impact on the entire supply chain system needs to be considered, since reducing the negative environmental impact in one part of the system might cause more negative impacts in others.

There is a clear focus on multi-modality to reduce CO<sub>2</sub> emissions in LC-C.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Multimodal transport leads to restructuring of supply chains and impacts the:

(i) technical development of vehicles, transhipment equipment and information management.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) location of facilities and the design of the distribution network to achieve freight consolidation.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Multimodality needs to consider the interdependent activities and dynamic character of supply chains, because reducing the negative environmental impact in one part of the system might cause more negative impact in another.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current activities to reduce environmental degradation: Pollution - Micro Perspective

An approach to reduce emission is to increase the utilisation rate of transport capacity by coordinating the haulage of different companies and real time information allowing continual adoption of routes and schedule. Other important approaches are the implementation of clean technologies and the introduction of special emission zones that only allow transport vehicles to enter when complying with particular emission control devices or cleaner fuel. Observed activities to reduce land and water contamination along trade gateways and corridors are related to regulation, higher safety standards and cleaner technologies.

Emissions in the logistics sectors are currently reduced through:

(i) increased utilisation of transport capacity.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) implementation of clean and efficient technologies.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(iii) specialised zones restricting the level of emission.

- strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



Activities to reduce land / water contamination along trade gateways and corridors include:

(i) safety standards and regulation to reduce hazardous spills and waste disposal.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) safer and cleaner technology and designs.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current activities to reduce environmental degradation: Land use and its degradation

Other activities aim to minimise unnecessary land consumption and its associated destruction of natural habitats. Regulations can force environmental impact studies before commencing infrastructure developments, which result in management plans that list preventive actions to reduce negative effects. Laws also ensure the relocation of endangered habitats and can involve the reservation of land to offset native vegetation losses. Additionally, rigorous refinements of technology and efficient processes can be implemented when developing infrastructure, but this also includes the switching to better designs and technical innovations for logistics facilities enabling efficient land utilisation.

To reduce degradation of natural habitats, efficient technology and management structures are established:

(i) when developing logistics infrastructure (e.g. recycling plant for contaminated sediments).

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) to increasing the land utilisation logistics infrastructure.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

To minimise land consumption and the destruction of natural habitats, laws and regulations are introduced to ensure:

(i) environmental impact studies before infrastructure development.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) the relocation of endangered flora / fauna and the land reservation to offset native vegetation losses

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

### Current activities to reduce environmental degradation: Noise, odour and visual appearance

The reductions of noise can be ensured by anti-noise barriers and sound proofing of facilities. In regards to transport vehicle noise and odour reductions can be achieved through the introduction of better technologies. The visual appearance of massive logistics related infrastructure can be upgraded by landscaping standards that harmonise with the surrounding environment and the use of new design elements that create a positive visual effect.

To reduce noise the following measures are applied:

(i) quieter technologies (e.g. low noise engines or brake systems especially for trains).

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) anti-noise barriers and sound-proofing of buildings.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

To reduce odour filters and better engine technologies are applied.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

To reduce the diminution of visual appearance, consistent standards and design elements are introduced creating positive visual effects.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Do you agree with the way in which the determinants of the environmental impact category have been drawn together in the model?

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Are there any comments on the way the 'Environmental Impact' category is described and presented that you would like to make?

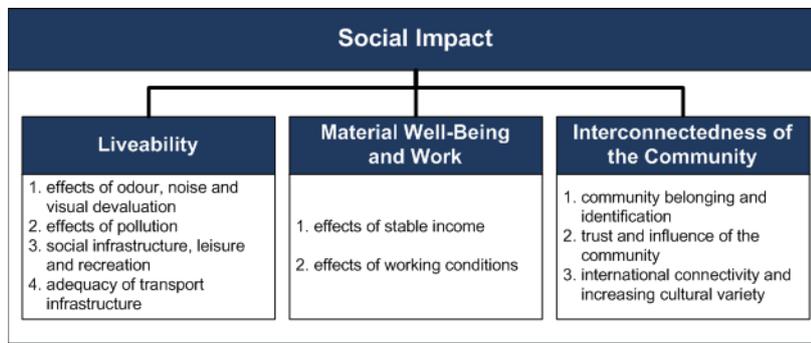
Comments

## Part V-3:

### The 'Social Impact' category of a Logistics City-Cluster



The term social impact refers to the effects that are experienced on personal, family or community levels induced by the LC-C. Hence, it includes the influences from the economic and environmental effects on the social system, due to the overlap of the three sustainability dimension. The observed effects are classified in three categories. First the **liveability** having four core subtleties that detail the quality of the living and reflects the central role that the agglomeration of logistics activities plays in the establishment and growth of communities. Second the **material wellbeing and work related impacts** of the population that includes the effects of income but also the working conditions associated with the logistics sector. Third the **interconnectedness of the community** discussing two main notions of the cultural effects on the social system.



**Liveability: The effects of odour, dust, noise and pollution**

Odour, dust or noise induced by logistics activities can interfere with the quality of life, which results initially in emotional ill-being that can further evolve to physical health problems. There are also hazardous effects due to emissions that can lead to adverse health conditions such as breathing or cardiovascular system problems. The same effects plus dermatological distress can occur because of water and land contamination. Whilst the impact on health in areas having a strong concentration of logistics industry can be high, specific hazards depend on the degree of exposure and the conditions of the individuals.

The effects of noise, odour, dust and pollution can be very irritating for persons in close proximity of logistics activities that can result in adverse health effects such as:

(i) emotional ill-being leading to chronic stress, sleep disorders, annoyances and adverse social behaviour.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) physical health problems (e.g. high blood pressure, hearing impairments, asthma).

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The hazard to health is higher in areas having a significant concentration of logistics activities, which has considerable consequences for the region because of economic expenses.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

**Liveability: The effects on social infrastructure, leisure and recreation opportunities**

The income raised by governments based on logistics activities can enable funding for social services and infrastructure, which has a positive impact on liveability. The expenditures for these should reflect the demand and requirements of the workforce. Leisure and recreation opportunities are also impacted on by the core activities and community values of a LC-C. For example the leisure and recreational activities around a seaport provide maritime festivals or a harbour museum. It seems that the effects on social infrastructure and leisure opportunities contribute to a more stable workforce and more competitive firms.

Tax and duties raised by governments based on logistics activities have a positive impact on the liveability because:

(i) the quality and quantity of social infrastructure can be increased.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) the accessibility of social infrastructure can be improved.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Logistics activities impact the leisure and recreation opportunities in a positive way, attracting workforce and further economic activities.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

**Liveability: Adequacy of transport infrastructure**

The overall upgrading of transport infrastructure brings advantages for local user. Nevertheless, there can be challenges because the high density of commercial transport can impede traffic flow, especially in situations where freight transport is combined with urban private traffic. This reduces the liveability of a region by causing personal distress and unsocial behaviour. There can be also a negative impact on personal safety induced by accidents resulting from freight transport.

A positive impact based on the overall better transport infrastructure results in better connectivity and flexibility for the community.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

Structural congestion of the transport network can occur when commercial transport is combined with private traffic and is based on ill-adapted infrastructure and poor administrative procedures.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

The impact on liveability in a LC-C is reduced due to:

(i) congestion that can cause personal distress and unsocial behaviour.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove

(ii) the risk on personal safety resulting from transport accidents causing injuries and deaths.

strongly approve  approve  somewhat approve  neutral  somewhat disapprove  disapprove  strongly disapprove



### Material well-being and work related impact: Effects of stable income

The income from logistics activities enhances regional financial stability and can increase living standards, which have a positive impact on people's sense of well-being. Although there is a correlation between the size of income and personal happiness, the positive advantages of financial stability especially accounts for the workforce employed in the unskilled/semiskilled sector having an average lower income. Additionally, stable income can provide a healthier lifestyle, decrease anti-social behaviour and contribute to the positive self image of the community.

Income from logistics activities facilitates financial stability for all workforce levels that:

(i) decreases psychological stress and anti-social behaviour.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) provides a stable lifestyle and increases their living standards (e.g. provision of more luxury items).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(iii) contributes to the positive self image of the community.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

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The positive impact of financial stability is an obvious concern for LC-C, since the majority of the workforce is employed in the unskilled/semiskilled sector.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Material well-being and work related impact: Effects of working conditions

Working to earn an income can be seen as a personal trade-off, since increasing material wellbeing requires increase in working hours and responsibility resulting in decline of leisure time. Logistics is a 24/7 activity and a physical demanding sector for many occupations. This results in irregular working times and hard labour, which have a negative impact on health and social life. This can lead to disturbed sleeping patterns, reduced parental responsiveness, mental health problems and to family discord.

Logistics is a 24/7 activity and physical demanding for many occupations that result in irregularly working hours and hard labour.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Challenging working times and hard work conditions of the logistics sector have a negative effect on mental health, family time and social life that is:

(i) strongly associated with the transport, transhipment and warehouse sector.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) associated on a minor level with the highly skilled workforce.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Interconnectedness of the community: Belonging and identification with the local community

Belonging and identification relate to the sense of participation and acknowledgement within the community, which are important elements for the well-being of people. Logistics activities as the core economic driver are closely bound with the community and therefore should be an accepted member and contribute to the community's well-being. Logistics firms can meet these requirements by community investments that focus on a positive relationship with the people. This includes the arrangement of physical facilities and social events as well as sponsoring learning clusters, sport and culture.

Belonging and identification of the people as a community can enhance the well-being and the self-image of the workforce.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

Logistics firms increase the belonging and identification through community investment such as:

(i) physical facilities and social services (e.g. maritime museum, seafarer house).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

(ii) sponsoring of events, culture and learning clusters (e.g. sailing race, maritime festivals or education centre).  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

The community investments of logistics firms can lead to a stronger community bond because it creates shared memories that have similar values and beliefs.  
 strongly approve    approve    somewhat approve    neutral    somewhat disapprove    disapprove    strongly disapprove

### Interconnectedness of the community: Trust and influence of the local community

Trust and influence of the people is important for community development, which can increase people's well-being. It reflects the possibilities of the community having an understanding and partial control over the impacts induced by logistics activities. The logistics sector can build trust and increase the influence of the people through transparent information and by acknowledging the needs, values and opinions of the community. This increased trust and involvement can further strengthen the identification and belonging with the social system, which reinforces appropriate community behaviour.



The logistics industry increases trust and influence of the community by informing the people about logistics and involving them in major logistics developments.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

Involving the community members by acknowledging their needs, values and opinions:

(i) guarantees a balance when making logistics economic decisions that effect the environment and the society.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

(ii) will strengthen the identification and belonging of the people with the logistics sector that reinforces well-being.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

**Interconnectedness of the community: Increased international character**

Global connectivity and the international character of logistics can lead to an increase of passenger travel, international recognition and an open economy. Hence, LC-C are strongly influenced by other cultures enhancing the variety of life aspects. A multi-culture base can also strengthen the bonds with international location (e.g. family ties), which will be reflected in trade behaviour. However, the integration of different cultures can cause tensions in a community because of different values and beliefs. This challenge can be tackled through community investments that increase the feeling of belonging to and identification.

LC-C are strongly influenced by other cultures and languages and have a wider cultural base in their communities.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

The international influences on LC-C and their wider cultural base can:

(i) enhance the variety of life aspects.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

(ii) have a positive feedback to the logistics business activities and international trade.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

(iii) cause tensions based on different values and beliefs.

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

Do you agree with the way in which the determinants of the social impact category have been drawn together in the model?

- strongly approve  
  approve  
  somewhat approve  
  neutral  
  somewhat disapprove  
  disapprove  
  strongly disapprove

Are there any comments on the way the 'Social Impact' category has been described and presented that you would like to make?

Comments

Thank you for agreeing to participate in this study. As you may know this work is an integral part of one important research stream of the Institute for Logistics and Supply Chain Management but also for the PhD of Mr. Carsten Sengpiehl, which explains why it is comprehensive and complex.

We appreciate you taking valuable time not only for this survey but also for the respective interviews last year.

The information received will be now statistically tested and analysed. The findings will be compiled into a substantive framework. The developed framework and its drawn implications is likely to be of significant use for stakeholders of a LC-C such as government departments, logistics cluster initiatives and for logistics operators. It is intended that the framework and its elements can be used as a generic tool-kit that can be transformed or adapted for regional needs to support decision making when developing or modifying existing LC-C. Consequently the potential to improve the quality and effectiveness of LC-C, based on the developed model and knowledge, can be exploited.

Thank you and we are looking forward to receiving your helpful feedback.

Could you please forward us your feedback via E-Mail by pressing the "Submit by Email" button or in a way that is most suitable for you.

Submit by Email

Print Form