

Philip Wessely

# **Value Determination of Supply Chain Initiatives**

A Quantification Approach Based on  
Fuzzy Logic and System Dynamics

Mit einem Geleitwort von Prof. Dr. Wolfgang Stölzle



**RESEARCH**

# Index

<b>Index</b> .....	<b>IX</b>
<b>List of figures</b> .....	<b>XIII</b>
<b>List of tables</b> .....	<b>XV</b>
<b>List of abbreviations</b> .....	<b>XVII</b>
<b>Abstract</b> .....	<b>XIX</b>
<b>1 Introduction and relevance of the research on the value determination of SCIs</b> .....	<b>1</b>
1.1 Background and relevance of the research .....	1
1.2 Objectives and research questions .....	3
1.3 Positioning within scientific research .....	4
1.4 Outline of the dissertation .....	12
<b>2 Theoretical backdrop of the research on the value determination of SCIs</b> .....	<b>15</b>
2.1 Understanding of supply chain management and therein located initiatives ...	15
2.2 Underlying comprehension of value in supply chains .....	17
2.3 Identification of relevant research fields .....	21
2.4 State of the art in the value determination of SCIs .....	23
2.5 Summary of the theoretical backdrop .....	27
<b>3 Methodological fundamentals of the research on the value determination of SCIs</b> .....	<b>29</b>
3.1 Conceptual considerations underlying the conducted research .....	29
3.2 Introduction to fuzzy logic .....	32
3.3 Introduction to system dynamics .....	38
3.4 Summary of the methodological fundamentals .....	41

<b>4 Conceptual framework of the quantification approach .....</b>	<b>43</b>
4.1 Framework for the quantification of an SCI's value contribution .....	43
4.2 A numerical example from the consumer goods industry .....	51
4.3 Discussion of the conceptual framework .....	57
4.4 Summary of the conceptual framework .....	59
<b>5 Determination of an SCI's effect on revenues.....</b>	<b>61</b>
5.1 Relevant fundamentals of determining an SCI's revenue contribution .....	62
5.2 Derivation of the logistics customer service-revenue curve .....	64
5.3 A fuzzy model for quantifying the logistics customer service-revenue curve .....	67
5.4 A numerical example from the consumer goods industry .....	76
5.5 Discussion of the fuzzy model .....	82
5.6 Summary of the fuzzy model .....	84
<b>6 Determination of an SCI's effect on costs and capital commitment.....</b>	<b>86</b>
6.1 Relevant fundamentals of determining an SCI's effect on costs and capital commitment .....	87
6.2 Simulation model for the determination of changes in costs and capital commitment .....	89
6.3 Processing of the simulation output parameters .....	96
6.4 A numerical example from the pharmaceutical industry .....	99
6.5 Discussion of the system dynamics model .....	105
6.6 Summary of the system dynamics model .....	108
<b>7 Conclusion of the research on the value determination of SCIs .....</b>	<b>110</b>
7.1 Summary of goals and contribution of the research .....	110
7.2 Scientific implications of the developed quantification approach.....	110
7.3 Managerial implications of the developed quantification approach.....	112
7.4 Conclusion and limitations of the research.....	112
7.5 Recommendations for further research.....	114

---

<b>References .....</b>	<b>117</b>
<b>Appendix .....</b>	<b>145</b>