



Alfred Benedikt Brendel (Autor)

Applied Design Science Research in the Context of Smart and Sustainable Mobility

The Case of Vehicle Supply and Demand Management in
Shared Vehicle Services



Göttinger Wirtschaftsinformatik

Herausgeber: J. Biethahn* • L. M. Kolbe • M. Schumann

Alfred Benedikt Brendel

Applied Design Science Research in the Context of Smart and Sustainable Mobility

The Case of Vehicle Supply and Demand
Management in Shared Vehicle Services

Band 93



Cuvillier Verlag Göttingen

Internationaler wissenschaftlicher Fachverlag

<https://cuvillier.de/de/shop/publications/7690>

Copyright:

Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen,
Germany

Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: <https://cuvillier.de>



Table of Contents

Table of Contents	i
List of Figures	iv
List of Tables	v
Acronyms	vii
A – Foundations	1
I Introduction	2
I.1 Motivation.....	2
I.2 Research Gaps and Research Questions.....	6
I.3 Structure of this Thesis	10
I.4 Research Design	14
I.5 Anticipated Contributions	18
II Related Research	22
II.1 Conceptual Confusion in Design Science Research.....	22
II.2 Design Science Research in Green IS.....	25
II.3 Decision Support Systems in Shared Vehicle Services	26
II.4 Decision Support Systems for Vehicle Supply and Demand Management in Shared Vehicle Services	28
B – Applied Design Science Research in Context of Shared Vehicle Services .	31
Study 1: Taxonomy of Vehicle Relocation Problems in Carsharing	32
Introduction	33
Research Approach	34
Results	37
Discussion.....	44
Conclusion	45
Study 2: Improving Electric Vehicle Utilization in Carsharing – A Framework and Simulation of an E-Carsharing Vehicle Utilization Management System	46
Introduction	47
Related work	49
E-Carsharing Vehicle Utilization Management System.....	53
Data Set.....	59
Discrete Event Simulation	62
Results	64
Discussion.....	68
Conclusion	70



Study 3: A Decision Support System for Computation of Carsharing Pricing Areas and its Influence on Vehicle Distribution	71
Introduction	72
Vehicle Relocation Research	74
Research Approach	77
Results	83
Discussion.....	90
Conclusion	93
Study 4: Adapting Carsharing Vehicle Relocation Strategies for Shared Autonomous Electric Vehicle Services	95
Introduction	96
Related Work	98
Research Approach	101
Proposed Framework.....	106
Evaluation via Simulation	111
Design Theory.....	115
Discussion.....	116
Conclusion	118
C – Synthesis of a Design Science Research Framework and Methodology...	119
Study 5: Addressing the Iterative Nature of Design Science Research: A Research Framework and Methodology.....	120
Introduction	121
Design Science Research.....	124
Iterative Design Science Research	127
Example of Applied Iterative Design Science Research	142
Discussion.....	146
Conclusion	147
D – Contributions	149
I Findings.....	150
I.1 Summary.....	150
I.2 Design Theory.....	155
II Implications.....	159
II.1 Implications for Theory.....	159
II.2 Implications for Practice	163
III Concluding Remarks.....	166
III.1 Limitations	167
III.2 Future Research	169



References 173

Appendixvii

Appendix A: Overview of the authors' contribution in the studies included in this thesis..... vii

Appendix B: Other published, forthcoming or submitted articles as of October 2017 viii