

Contents

Part I Focus and Scope of this Thesis

1	Introduction	3
1.1	Research Problem and Relevance	4
1.2	Research Questions	5
1.3	The Structure of This Dissertation	6
2	Conceptual Foundations: The Phenomenon of Patients and Caregivers as User Innovators	9
2.1	User Innovation	9
2.1.1	Heterogeneity of Needs	12
2.1.2	Stickiness of Information	12
2.2	Free Innovation	14
2.3	Lead User Theory	16
2.4	User Entrepreneurship	17
2.5	The Market Success of User Innovations	19
2.6	User Innovation in Healthcare	21
3	Research Gaps	27

Part II Are Patients and Caregivers the Better Innovators? The Case of Medical Smartphone Applications

4	Introduction: User Innovation and Medical Smartphone Applications	31
5	Theoretical Background and Hypothesis Development	35
5.1	Empirical Field: e-Health, m-Health, Digital Health	35

5.2	Medical Smartphone Apps	38
5.3	Hypothesis Development	41
5.3.1	Free Revealing of User-Developed Medical Apps	42
5.3.2	The Early Development of Medical Apps	43
5.3.3	Developer Type and the Quality of Medical Apps	43
5.3.4	Developer Type and the Download Numbers of Medical Apps	45
5.3.5	Developer Type and Medical App Revenues	46
5.3.6	Summary of Hypotheses: Research Model for Mediated Regression Analysis	46
6	Methodology	49
6.1	Analytical App Data	50
6.1.1	Data Collection	50
6.1.2	Operationalization of the Measures	54
6.1.3	Data Preparation and Assumptions for Regression Analysis	57
6.1.4	Data Analysis	63
6.2	Qualitative Data	64
6.2.1	Sampling and Data Collection	64
6.2.2	Data Analysis	65
7	Findings	67
7.1	Findings Concerning the Analytical App Data	67
7.1.1	Descriptive Analysis: Dataset 1 (2014)	67
7.1.2	Descriptive Analysis: Dataset 2 (2018)	70
7.1.3	The Emergence of Medical Apps: A Comparison Between Datasets 1 (2014) and 2 (2018)	77
7.1.4	Regression Analysis of Dataset 2 (2018)	80
7.1.5	Summary of the Findings: Analytical App Data	94
7.2	Findings of Qualitative Data on Medical App Developers	96
7.2.1	Triggers for Innovative Endeavors	96
7.2.2	Product Development	99
7.2.3	Commercialization and Outcomes	99
7.2.4	A Summary of the Findings: Qualitative Data on Medical App Developers	101
8	Discussion	103
8.1	Summary of the Findings	103
8.2	Patients and Caregivers are Not (All) Free Innovators	104

8.3	The Early Development of Medical Smartphone Apps was Triggered by User-Developers	105
8.4	Apps Developed by Patients and Caregivers are of Higher Quality	107
8.5	Company-Developed Apps are the Most Frequently Downloaded Apps	108
8.6	Patients and Caregivers Develop Financially Successful Medical Apps	109
9	Preliminary Conclusions	111
9.1	Theoretical Implications	111
9.2	Managerial Implications	113
9.3	Limitations and Further Research	114
Part III	User Entrepreneurs for Social Innovation – The Case of Patients and Caregivers as Developers of Tangible Medical Devices	
10	Introduction: User Entrepreneurs for Social Innovation	119
11	Theoretical Background and Research Questions	123
11.1	Opportunity Recognition and Exploitation in Entrepreneurship	123
11.2	Opportunity Recognition and Exploitation by Patients and Their Caregivers	124
11.3	Social Innovation	125
11.4	Research Questions	126
12	Methodology	129
13	Findings	133
13.1	Descriptive Findings	133
13.2	Unmet Medical Needs	136
13.3	Opportunity Recognition	137
13.3.1	Ideation	137
13.3.2	Prototype Development	137
13.3.3	Intellectual Property	139
13.4	Opportunity Exploitation	140
13.4.1	Product Development	140
13.4.2	Regulatory Approval	141
13.4.3	Production and Distribution	142

13.5 Market Launch	144
14 Discussion	147
15 Preliminary Conclusions	151
15.1 Theoretical Implications	151
15.2 Managerial Implications	153
15.3 Limitations and Further Research	154
Part IV Integration of Findings, Implications, and Conclusion	
16 Summary of Findings	157
17 Implications and Conclusion	161
17.1 Theoretical Implications	161
17.2 Managerial Implications	164
17.3 Implications for Health Policy	165
17.4 Conclusion	166
References	169