

Contents

Acknowledgements	V
List of Tables.....	XV
List of Figures	XVII
List of Abbreviations.....	XIX

Introduction..... 1

Part I: Knowledge as a valuable resource 9

1 Concepts and measurement of value.....	9
1.1 Valuation process: Evaluation vs. Valuation.....	9
1.2 Valuation content: Value definitions.....	10
1.3 Sources of value: Transactions and compliance with regulations.....	10
2 Knowledge as a multifaceted concept.....	13
2.1 The philosophical approach to knowledge	13
2.1.1 Historical review from Plato to Dewey	14
2.1.1.1 The nature of knowledge: Justified true belief.....	14
2.1.1.2 The origin of knowledge: Rationalism vs. Empiricism.....	14
2.1.2 Implications for knowledge definition.....	19
2.2 The economic approach to knowledge	20
2.2.1 Knowledge, competitive advantages, and the resource-based view of the firm.....	20
2.2.2 Assumptions of the knowledge-based view of the firm.....	23
2.2.3 Units of analysis of the knowledge-based theory of the firm: Tacit and explicit knowledge.....	23
2.2.3.1 Polanyi's concept of tacit knowing.....	23
2.2.3.2 Tacitness and explicitness from an economic point of view.....	25
2.2.4 Sources of knowledge.....	26
2.2.4.1 Sources on the individual level	26
2.2.4.2 Sources on the firm level	27
2.2.4.3 On the relationship between the knowledge of a firm and the knowledge of its employees	29
2.2.5 Knowledge and the existence of the firm	30
2.2.5.1 Explanations for the emergence of firms as institutions in a free-market economy	31
2.2.5.2 A knowledge-based explanation for the multitude of firms as institutions in a free-market economy	33
2.2.6 The coordination of knowledge within the firm	33
2.2.6.1 The need for coordination.....	33
2.2.6.2 Means of coordination	34
2.2.7 The boundaries of the firm	35
2.2.7.1 Boundaries of the firm and competitive advantage.....	36
2.2.7.2 Depth of the firm's value chain: Vertical boundaries	36
2.2.7.3 Breadth of the firm's value chain: Horizontal boundaries	38
2.2.8 Critique and empirical tests of the knowledge-based view of the firm	39
2.2.8.1 Theoretical arguments.....	39
2.2.8.2 Empirical results	40
2.2.9 Implications for knowledge definition.....	41
2.3 The definition of knowledge	41
2.3.1 Knowledge as the interpretation of facts by the mind of a human being	42
2.3.1.1 The subject of interpretation: Fact	42
2.3.1.2 The active interpreter: The mind.....	43
2.3.2 Levels of knowledge.....	43
2.3.2.1 Know-what	43
2.3.2.2 Know-why	43

2.3.2.3 Know-how	44
2.3.2.4 Know-who	45
3 The value of knowledge	45
3.1 Value potential and value realization	45
3.2 Appropriating the value of knowledge	46
3.2.1 The publicity of facts: Transmission channels for explicit and implicit knowledge	46
3.2.1.1 Mobile workforce	46
3.2.1.2 R&D monitoring	48
3.2.1.3 Reverse engineering	48
3.2.1.4 Customer-specific products	49
3.2.2 Implicit knowledge: Transferability and appropriation	49
3.2.3 Explicit knowledge: Transferability and appropriation	49
3.3 Strategic options for solving appropriability problems	51
3.3.1 Strategies for avoiding involuntary transfer of facts	51
3.3.1.1 Secrecy	51
3.3.1.2 Organizational design	52
3.3.2 Strategies for avoiding unintended value exploitation of facts	53
3.3.2.1 Costly imitation	53
3.3.2.2 First-mover advantages: Increasing imitation time	54
3.3.2.3 Legal and contractual mechanisms	55
4 Part I: Implications for patent valuation	56
Part II: Protecting knowledge-based competitive advantages through patents ... 59	
1 The legal dimension of patents	59
1.1 Roots and development of patent protection	59
1.1.1 The basic idea	59
1.1.2 History of patent protection	60
1.2 Substantial requirements according to German, European, and United States patent law	61
1.2.1 European and German patent law	61
1.2.1.1 Novelty	62
1.2.1.2 Inventive step	62
1.2.1.3 Industrial application	62
1.2.2 United States patent law	63
1.2.2.1 Novelty	64
1.2.2.2 Non-obviousness	65
1.2.2.3 Usefulness	66
1.3 Procedural requirements according to German, European, and United States patent law	66
1.3.1 German patent law	66
1.3.1.1 The examination process	66
1.3.1.2 Opposition by a third party	68
1.3.2 European patent law	69
1.3.2.1 The examination process	69
1.3.2.2 Opposition by a third party	72
1.3.3 United States patent law	73
1.3.3.1 The examination process	73
1.3.3.2 Reexamination procedure	75
1.4 International patent treaties	76
1.4.1 Paris Convention for the Protection of Industrial Property	76
1.4.1.1 Right of priority	76
1.4.1.2 National treatment for nationals of countries of the union	76
1.4.2 The Patent Cooperation Treaty	77
1.4.2.1 Patent application and examination procedure	77
1.4.2.2 Advantages of the PCT	78
1.5 Patent classification systems	78
1.5.1 International patent classification	79
1.5.2 European classification system	80

1.6 Patent infringement and patent litigation.....	80
1.6.1 Expectations and the prediction-failure model	81
1.6.2 Cost and benefits of patent litigation	81
1.6.3 Empirical results for patent litigation	83
1.6.3.1 Results for the failure prediction model.....	83
1.6.3.2 Results for the cost and benefits of litigation.....	84
2 The economic dimension of patents.....	85
2.1 Arguments for patent protection.....	86
2.1.1 Argument one: Natural property rights.....	86
2.1.2 Argument two: Inventor's reward	87
2.1.3 Argument three: Incentive to invent	87
2.1.4 Argument four: Incentive to disclose.....	87
2.2 The use of patents in modern economies: An analysis of patent functions.....	87
2.2.1 Primary patent function: Temporary monopoly and diffusion of inventions	87
2.2.2 Secondary patent functions.....	89
2.3 Measuring patent values through value constructs.....	91
2.3.1 A stylized theoretical model of value constructs	92
2.3.1.1 Model assumptions	92
2.3.1.2 Basic prerequisites for effective patent protection.....	93
2.3.1.3 An extended model of value constructs for the private value of patents.....	93
2.3.1.4 Standard case	95
2.3.1.5 Case of blocking patents	98
2.3.2 Theoretical implications for patent valuation	100
3 Part II: Implications for patent valuation	104
Part III: Patent valuation.....	107
1 Valuation background.....	107
1.1 Process of valuation.....	107
1.1.1 Step one: Motivation for valuation	107
1.1.2 Step two: Data collection and analysis	107
1.1.3 Step three: Application of three approaches to value	108
1.1.4 Step four: Conclusion of value	108
1.2 Functions of valuation	108
2 Reasons for valuation	109
2.1 Valuation for management purposes	109
2.1.1 Sale, purchase, or licensing of patents.....	109
2.1.2 Cooperation between companies	109
2.1.3 Spin-off activities	110
2.1.4 Patent securization	110
2.1.5 Compensation of employee-inventors	111
2.1.6 Patent portfolio management.....	111
2.2 Disclosing information to shareholders.....	112
2.2.1 German HGB and DRS 12: Recognition criteria.....	113
2.2.2 German HGB and DRS 12: Disclosure and measurement	113
2.2.3 International Financial Reporting Standards: Recognition criteria	114
2.2.4 International Financial Reporting Standards: Disclosure and measurement	115
2.2.5 United States Generally Accepted Accounting Principles: Recognition criteria.....	116
2.2.6 United States Generally Accepted Accounting Principles: Disclosure and measurement.....	117
3 Patent valuation – A review of existing approaches to value.....	119
3.1 Direct patent valuation: Three approaches to value	119
3.1.1 The principle of substitution: Cost approach.....	120
3.1.1.1 General introduction	120
3.1.1.2 Components of cost	120

3.1.1.3	Type of cost	121
3.1.1.4	Temporal dimension of cost.....	123
3.1.2	The principles of equilibrium and competition: Market approach	124
3.1.2.1	General introduction	124
3.1.2.2	Multiple and analogy	125
3.1.2.3	Market replacement cost method	127
3.1.2.4	Residual value method.....	128
3.1.3	The principle of expectation: Income approach	128
3.1.3.1	General introduction	128
3.1.3.2	The differences between patent valuation and company valuation.....	129
3.1.3.3	Measuring economic income	132
3.1.3.4	Determining the remaining useful life	137
3.1.3.5	Accounting for time and risk	142
3.1.3.6	Accounting for flexibility and changing risk	144
3.2	Indirect patent valuation: The analysis of bibliographic value indicators	147
3.2.1	Valuation approach.....	147
3.2.2	Empirical results for patent values	154
3.3	Evaluation of different approaches to values	157
3.3.1	Evaluation of direct patent valuation methods	157
3.3.1.1	Key criteria for evaluation	157
3.3.1.2	General assessment of different direct valuation approaches	159
3.3.2	Evaluation of the indirect valuation approach	161
4	The valuation of patents: A comprehensive approach to value	163
4.1	Basic rationale and database compilation.....	163
4.2	Definition of valuation horizon	165
4.3	Definition of economic benefits	165
4.4	Valuing cooperative and exclusive exploitation.....	167
4.5	Getting robust results.....	171

Part IV: Exploiting patent protection of knowledge-based competitive advantages through market transactions 173

1	Transferring the economic potential of knowledge and patents through licensing:	
	Which contractual features affect the value of knowledge?	173
1.1	Introduction	173
1.2	Drivers, purpose, and objectives of licensing contracts	174
1.3	The life cycle of a licensing contract: A two-stage model	175
1.3.1	Stage one: Negotiation period	176
1.3.1.1	Negotiation period: Licensor's perspective	177
1.3.1.2	Negotiation period: Licensee's perspective	178
1.3.2	Stage two: Contract period	179
1.3.2.1	Contract period: Compensation provisions.....	179
1.3.2.2	Contract period: Duration and termination	180
1.4	Development of hypotheses	181
1.4.1	Hypotheses: Negotiation period	181
1.4.2	Hypotheses: Contract period.....	182
1.5	Empirical results.....	183
1.5.1	Data collection and transformation.....	183
1.5.2	Definition of variables	185
1.5.2.1	Dependent variable	185
1.5.2.2	Independent variables	185
1.5.3	Sample description	186
1.5.4	Multivariate analysis.....	188
1.6	Discussion	190
1.7	Conclusion and further research	193

2 On the reliability of indirect patent valuation – Testing bibliographic value indicators with patent market values.....	194
2.1 Sample description	195
2.2 Development of hypotheses	196
2.3 Empirical results	199
2.4 Discussion	203
2.5 Conclusion and further research	206
Conclusion	207
References	217
List of legal documents	246
List of court decisions	249