

---

# Contents

---

<b>Introduction</b> . . . . .	ix
<b>Part 1. Presentation of Dual Innovation System</b> . . . . .	1
<b>Introduction to Part 1.</b> . . . . .	3
<b>Chapter 1. Definitions of Technological Duality</b> . . . . .	5
1.1. Introduction. . . . .	5
1.2. Duality. . . . .	6
1.2.1. From spin-offs to duality . . . . .	6
1.2.2. Technological duality . . . . .	8
1.3. Actors and objectives of duality. . . . .	16
1.3.1. Dual strategies of companies . . . . .	17
1.3.2. Dual policies of innovation . . . . .	22
1.4. Conclusion . . . . .	27
<b>Chapter 2. The Knowledge System as Unit of Analysis</b> . . . . .	29
2.1. Introduction. . . . .	29
2.2. Technological knowledge systems and knowledge dissemination. . . . .	30
2.2.1. Unit of analysis . . . . .	30
2.2.2. Knowledge dissemination. . . . .	38
2.3. Knowledge dissemination and duality . . . . .	47
2.3.1. Dual knowledge. . . . .	47
2.3.2. Dual process of knowledge dissemination . . . . .	52
2.4. Conclusion . . . . .	56

<b>Chapter 3. Definition and Operation of Dual Innovation System</b> . . .	57
3.1. Introduction. . . . .	57
3.2. Dual innovation system. . . . .	57
3.2.1. Approach in terms of IS . . . . .	57
3.2.2. Definition of a DIS . . . . .	62
3.3. Objectives and functions of a DIS . . . . .	66
3.3.1. In economic and technological terms . . . . .	66
3.3.2. Duality measure within a DIS . . . . .	68
3.3.3. DIS for the autonomous vehicle . . . . .	70
3.4. Conclusion . . . . .	72
<b>Conclusion to Part 1</b> . . . . .	73
<b>Part 2. Methodological Tools and Empirical Study of the Duality of Technological Systems</b> . . . . .	75
<b>Introduction to Part 2.</b> . . . . .	77
<b>Chapter 4. Identification of Technological Knowledge Systems in Defense.</b> . . . . .	83
4.1. Introduction. . . . .	83
4.2. EDT and analysis of knowledge flows . . . . .	84
4.2.1. Economic dominance theory . . . . .	84
4.2.2. Application to knowledge analysis through patents. . . . .	94
4.3. Graph theory applied to technological knowledge systems. . . . .	98
4.3.1. TKS identification method . . . . .	98
4.3.2. Application to knowledge flows . . . . .	100
4.4. Conclusion . . . . .	104
<b>Chapter 5. Evaluation of the Dual Potential of Technological Knowledge Systems: Analysis in Terms of Coherence</b> . . . . .	105
5.1. Introduction. . . . .	105
5.2. Technological coherence . . . . .	106
5.2.1. Theory of relatedness and coherence . . . . .	106
5.2.2. Duality scale in relation to TKS internal structure . . . . .	110
5.3. Analysis of the duality of technological knowledge systems. . . . .	118
5.4. Conclusion . . . . .	143

---

<b>Chapter 6. Analysis of the Dual Influence of Technological Knowledge Systems</b> . . . . .	145
6.1. Introduction. . . . .	145
6.2. Influence and duality . . . . .	146
6.2.1. Internal influence and external influence . . . . .	147
6.2.2. Measures of influence . . . . .	153
6.3. Dual analysis of influence . . . . .	159
6.3.1. The indicators . . . . .	159
6.3.2. Analysis of the duality of a TKS . . . . .	163
6.4. Conclusion . . . . .	180
<b>Conclusion to Part 2</b> . . . . .	183
<b>General Conclusion</b> . . . . .	185
<b>References</b> . . . . .	191
<b>Index</b> . . . . .	209