Contents

List of Figures xiii
List of Tables xxi
List of Frames xxv
Preface xxvii
Acknowledgments xxxi
Abbreviations and Acronyms xxxiii

1. Science, Technology, and Innovation: Paths for Alternative Futures

1.1 Introduction 1
1.2 A Historical Perspective 2
1.3 Toward a Better Future for Science, Technology, and Innovation in the Arab Countries 3
1.3.1 STI Capacity Building Was Already Suffering Before the Current Turmoil 4
1.3.2 Failed Policies and Wasted Resources Could Have the Effect of Subverting the Very Systems That Initiated Them 5
1.3.3 Cash Making Innovations May Be Good but Others Are Also Needed 7
1.3.4 Government Contributions to STI Capacity Building Is Essential, but Contributions to Many Others Will Be Crucial 7
1.4 Concluding Remarks 8
Endnotes 9

2. The Arab Countries' Economies and Development Policies

2.1 Introduction 14
2.2 The Levant Group of Arab Countries 15
2.2.1 Iraq 15
2.2.2 Jordan 18
2.2.3 Lebanon 21
2.2.4 Palestine 24
2.2.5 Syria 27

2.3 Arab Countries of the Nile Valley; Egypt and Sudan 31
2.3.1 Egypt 31
2.3.2 Sudan 35
2.4 The Arab Countries of North Africa 39
2.4.1 Algeria 39
2.4.2 Morocco 44
2.4.3 Tunisia 47
2.4.4 Libya 51
2.4.5 Mauritania 53
2.4.6 Policy Challenges and Future Prospects 56
2.5 Arab Countries of the Gulf 58
2.5.1 Bahrain 58
2.5.2 Kuwait 62
2.5.3 Oman 65
2.5.4 Qatar 69
2.5.5 Saudi Arabia 74
2.5.6 The United Arab Emirates 80
2.5.7 Yemen 86
2.5.8 Socioeconomic Development in the Arab Gulf Countries 90
2.6 Economies of the Arab East African Countries; Comoros, Djibouti and Somalia 91
2.6.1 Comoros 92
2.6.2 Djibouti 93
2.6.3 Somalia 95
2.6.4 Challenges Facing Future Development 96
2.7 Conclusions 97
Annex Table 100
Endnotes 101

3. Science, Technology, and Innovation Policies and Institutional Landscapes

3.1 Introduction 114
3.2 The Levant Countries 116
3.2.1 Iraq's Science, Technology, and Innovation System; Evolution and Recent Developments 116
3.2.2 Jordan's STI System, Policies and Institutions 132
3.2.3 Lebanon's STI Policies and Institutions 147
3.2.4 Palestine's STI System, Its Institutions and Priorities 165
3.2.5 The State of STI in Syria 173
3.2.6 Concluding Remarks 197
3.3 Arab Countries of the Nile Valley 200
3.3.1 Egypt's STI System 200
3.3.2 STI in Sudan 216

3.4 The Arab Countries in North Africa; Algeria, Libya, Mauritania, Morocco, and Tunisia 224
3.4.1 STI in Algeria; Policies, Institutional Settings and Future Prospects 224
3.4.2 STI Activities in Libya 229
3.4.3 Mauritania's STI System; Policies, Institutions and Research Activity 234
3.4.4 Morocco's STI Policies, Institutions, and Research Activity 238
3.4.5 Tunisia's STI System; Its Governance, Policies, and Institutions 250
3.5 The Gulf Arab Countries 265
3.5.1 Bahrain's STI System; Policies and Institutional Entities 266
3.5.2 Kuwait's STI System; Policies, Institutions, and Their Activities 270
3.5.3 STI in Oman; Policy Frameworks and Principal Institutions 281
3.5.4 STI in Qatar 290
3.5.5 Saudi National STI System 299
3.5.6 United Arab Emirate's STI System; Policies and Institutions 309
3.5.7 Yemen's STI System 316
3.6 Science, Technology, and innovation in Comoros, Djibouti, and Somalia 323
3.6.1 The Comorian STI System 323
3.6.2 Djibouti's STI Scene 324
3.6.3 Somalia's STI Scene 325
3.6.4 Concluding Remarks 326
3.7 Chapter's Concluding Remarks 327
Annex Tables 329
Endnotes 341

4. Research Output by the Arab Countries

4.1 Research Publications 364
4.1.1 Introduction 365
4.1.2 Research Publications by the Arab Countries: An International Perspective 365
4.1.3 Citations and Impact of Publications by Researchers in the Arab Countries 380
4.1.4 Research Capacity Building and Disciplines Targeted by Arab Researchers' Publications 386
4.1.5 Scientific Research Publications in Arab Journals 397
4.1.6 Scientific Collaboration Reflected by Research Publications 402
4.1.7 Arab Research Publications: Concluding Remarks 407

4.2 Patenting Activity by the Arab Countries 408
4.2.1 Introduction 408
4.2.2 Patents Granted by the United States Patent and Trademark Office 408
4.2.3 Patents Filed With the European Patent Office 412
4.2.4 Distribution of Patents From the Arab Countries Across Patent Classes 415
4.2.5 Concluding Remarks on Patenting Activity by the Arab Countries 427
4.3 Concluding Remarks 428
Annex Tables 430
Endnotes 450

5. Innovation and Entrepreneurship in the Arab Countries

5.1 Introduction 455
5.2 Measuring Innovation 457
5.2.1 The Global Innovation Index 458
5.2.2 The Global Competitiveness Report 459
5.2.3 The Global Innovation Index; Arab Countries' Scores and Rankings 460
5.2.4 Scores and Rankings Based on the Global Competitiveness Index 464
5.2.5 Arab Countries' Scores and Rankings on the Composite Innovation Index and Its Component Indices 467
5.2.6 Changes in CII Scores and Rankings 467
5.2.7 Scores and Rankings on the Technological Readiness Index and Its Component Indices 471
5.2.8 Changes in TRI Scores and Rankings 472
5.2.9 Innovation and Technological Readiness in the Arab Countries; Concluding Remarks 474
5.2.10 Role of Information and Communications Technology 475
5.3 Climate for Business in the Arab Countries 476
5.3.1 Ease of Doing Business Rankings of the Arab Countries 477
5.3.2 Ease of Doing Business in the Arab Countries Compared to Their Closest Neighbors 480
5.4 Concluding Remarks 482
Annex Tables 484
Endnotes 500

6. Arab Science, Technology, and Innovation Systems: Challenges, Policy Regimes, and Future Directions

6.1 Introduction 505
6.2 Challenges Facing STI Capacity Building in the Arab Countries 506
6.2.1 Governance, Rentierism, Corruption, and Cronyism 506

6.2.2 Education in the Arab Countries: Achievements and Enduring Challenges 514
6.2.3 Unemployment, Poverty, Inequality, and Labor Productivity in the Arab Countries 536
6.3 STI Capacity Building in the Arab Countries; Policies, Resources, and Institutions 541
6.3.1 National Vision and STI Policy Documents 541
6.3.2 Resource Allocations for STI Capacity Building 546
6.3.3 Novel STI Institutional Forms 548
6.3.4 Concluding Remarks 550
6.4 The Road Ahead: Future Directions for STI-Based Development 551
6.4.1 New Roles for Traditional and Novel Actors 551
6.4.2 Building New Institutional Forms 554
6.4.3 Alternative Means of Funding STI Activity 557
6.4.4 Promoting Innovation and Entrepreneurship in the Arab Countries 559
6.4.5 Cooperation and Networking for STI Capacity Building 562
6.5 Concluding Remarks 566
Endnotes 566

Index 571