GLOBAL CHALLENGES FOR
INNOVATION IN MINING
INDUSTRIES

People have been digging in the ground for useful minerals for thousands of years. Mineral materials are the foundation of modern industrial society. As the global population grows and standards of living in emerging and developing countries rises, the demand for mineral products is increasing. Mining ensures that we have an adequate supply of the raw materials to produce all the components of modern life, and at competitive prices. Innovation is central to meeting the diverse challenges faced by the mining industry. It is critical for developing techniques for finding new deposits of minerals, enabling us to recover increasing amounts of minerals from the ground in a cost-effective manner, and ensuring it this is done in a way that is environmentally responsible. This book provides the first in-depth global analysis of the innovation ecosystem in the mining sector. This book is Open Access.

Alica Daly is an experienced IP professional, currently working as a Senior Policy Officer in the Division of Artificial Intelligence Policy of the World Intellectual Property Organization (WIPO). Prior to her time at WIPO, she spent ten years working at IP Australia. Her most recent position there was as its first Head of Patent Analytics. During this time, she was responsible for co-authoring a number of reports published by the Patent Analytics Hub.

David Humphreys is an Honorary Lecturer at the University of Dundee, Scotland, and former Chief Economist at Norilsk Nickel and Rio Tinto. David has written and lectured extensively on the economics of the mining industry, authoring over 200 articles and papers on subjects ranging from commodity markets, trends in the mining sector, resource availability, sustainable development, Russian mining and the impact of China on mining, to national minerals policy.

Julio D. Raffo is Head of the Innovation Economics Section at the Department for Economics and Data Analytics of the World Intellectual Property Organization (WIPO). His research interests include the economics and metrics of innovation and intellectual property, with a particular focus on their intersection with socio-economic development.

Giulia Valacchi is based in the Department for Economics and Data Analytics of the World Intellectual Property Organization (WIPO). Before joining WIPO, she worked for the Centre of International Environmental Studies as a Research Assistant in the Sinergia Project. Her research interests include innovation, technology diffusion, climate change and environmental economics.
INTELLECTUAL PROPERTY, INNOVATION AND ECONOMIC DEVELOPMENT

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GLOBAL CHALLENGES FOR INNOVATION IN MINING INDUSTRIES

Edited by

ALICA DALY
World Intellectual Property Organization

DAVID HUMPHREYS
University of Dundee

JULIO D. RAFFO
World Intellectual Property Organization

GIULIA VALACCHI
World Intellectual Property Organization
CONTENTS

List of Figures page vii
List of Tables xii
List of Boxes xiv
List of Contributors xv
Acknowledgements xviii
Foreword xix

1 Global Challenges for Innovation in the Mining Industries 1
   ALICA DALY, DAVID HUMPHREYS, JULIO D. RAFFO AND GIULIA VALACCHI

2 Recent Trends of Innovation in the Mining Sector 25
   ALICA DALY, GIULIA VALACCHI, AND JULIO D. RAFFO

3 Mining Foreign Direct Investments and Local Technological Spillovers 52
   BRUNO CASELLA AND LORENZO FORMENTI

4 Innovation in Mining Global Value Chains: Implications for Emerging Economies 88
   MICHIKO IIZUKA, CARLO PIETROBELLI AND FERNANDO VARGAS

5 The Role of Transport-Related Innovation in the Mining Sector 117
   FRANCESCO DIONORI AND MARYAM ZEHTABCHI

6 Environmental Regulations in the Mining Sector and Their Effect on Technological Innovation 142
   MAXWELL ANDERSEN AND JOËLLE NOAILLY
vi CONTENTS

7 Global Trends of Innovation in the Mining Sector: the Role of Commodity Prices  172
GIULIA VALACCHI, ALICA DALY, DAVID HUMPHREYS AND JULIO D. RAFFO

8 IP Use and Technology Transfer in the Brazilian Mining Sector  202
DOMENICA BLUNDI, ANA CLAUDIA NONATO DA SILVA LOUREIRO, SERGIO MEDEIROS PAULINO DE CARVALHO, MARINA FILGUEIRAS JORGE, FELIPE VEIGA LOPES, GUSTAVO TRAVASSOS PEREIRA DA SILVA AND VITORIA ORIND

9 Innovation and IP Use in the Chilean Copper Mining Sector  231
CLAUDIO BRAVO-ORTEGA AND JUAN JOSÉ PRICE

10 The MINER Act of 2006: Innovating for Safety and Health in US Mining  257
ANDREW A. TOOLE, JAMES FORMAN AND ASRAT TESFAYE S

11 Innovation in the Canadian Mining Sector  278
BAHARAK COURTNEY DOAGOO, ELIAS COLLETTE, SEAN MARTINEAU, AMIRA KHADR, MARC NEVILLE AND MAZHAR BHAGAT

12 Recent Trends of Innovation and IP Use in the Mining Sector in Australia  308
ROHAN AMBURLE, ALMA LACKEN, EMMA FRANCIS, DEANNA TRAINHAM, GREG MALONEY AND CATRIONA BRUCE

Index  342
FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Simplified view of the life of a mine</td>
<td>5</td>
</tr>
<tr>
<td>1.2</td>
<td>Productivity in the Australian and US mining industries</td>
<td>10</td>
</tr>
<tr>
<td>2.1</td>
<td>R&amp;D expenditure in mining in Australia, 1993–2016</td>
<td>27</td>
</tr>
<tr>
<td>2.2</td>
<td>Worldwide mineral exploration expenditure (US $ bn) by commodity, 1994–2017</td>
<td>29</td>
</tr>
<tr>
<td>2.3</td>
<td>Worldwide mining technologies, 1990–2015</td>
<td>29</td>
</tr>
<tr>
<td>2.4</td>
<td>Worldwide mining technologies as share of technologies, 1991–2015</td>
<td>31</td>
</tr>
<tr>
<td>2.5</td>
<td>Patent families potentially related to mining by source</td>
<td>32</td>
</tr>
<tr>
<td>2.6</td>
<td>Simplified view of the lifecycle of a mine</td>
<td>33</td>
</tr>
<tr>
<td>2.7</td>
<td>Mining technologies by subsectors, 1990–2015</td>
<td>34</td>
</tr>
<tr>
<td>2.8</td>
<td>Distribution of mining technologies in subsectors by period, 1990–2015</td>
<td>35</td>
</tr>
<tr>
<td>2.9</td>
<td>Patents families in automation class over time</td>
<td>36</td>
</tr>
<tr>
<td>2.10</td>
<td>Mining production and innovation by country, selected countries</td>
<td>37</td>
</tr>
<tr>
<td>2.11</td>
<td>Mining innovation by top country of origin</td>
<td>39</td>
</tr>
<tr>
<td>2.12</td>
<td>Mining patents share by country, selected countries</td>
<td>40</td>
</tr>
<tr>
<td>2.13</td>
<td>Mining relative specialization index (RSI), selected countries</td>
<td>41</td>
</tr>
<tr>
<td>2.14</td>
<td>RSI by mining sub-sector, selected countries</td>
<td>43</td>
</tr>
<tr>
<td>2.15</td>
<td>Number of mining patents families over the years by type of stakeholder</td>
<td>45</td>
</tr>
<tr>
<td>2.16</td>
<td>Mining Firms by technology, by earliest priority year</td>
<td>48</td>
</tr>
<tr>
<td>2.17</td>
<td>Patent families of mining firms by WIPO technology field</td>
<td>48</td>
</tr>
<tr>
<td>3.1</td>
<td>Ownership profile of (large) mining firms. Largest 100 mining companies based on operating revenues (distribution based on number of firms)</td>
<td>54</td>
</tr>
<tr>
<td>3.2</td>
<td>Recent trends in mining FDI</td>
<td>57</td>
</tr>
<tr>
<td>3.3</td>
<td>Largest investors in mining FDI</td>
<td>59</td>
</tr>
<tr>
<td>3.4</td>
<td>Development impact of mining FDI, multiple dimensions</td>
<td>61</td>
</tr>
<tr>
<td>3.5</td>
<td>An analytical framework</td>
<td>65</td>
</tr>
<tr>
<td>3.6</td>
<td>R&amp;D expenditure of MNEs in UNCTAD top 100 ranking</td>
<td>68</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

3.7 The ownership profile of the top 100 applicants of mining patents Number of applications in the period 1990–2015, share to total 70
3.8 Internationalization of patent activity: evidence from WIPO patent statistics 72
3.9 Greenfield FDI by type of activity 75
3.10 Policy recommendations: linking analysis and practice for impact 77
4.1 Reserves of key minerals by countries’ income level (2015, %) 92
4.2 Proportion of mineral production (%) 92
4.3 Number of mining patent families, by country of origin (2004, 2014) 93
4.4 Mining GVC firms and patents by type of firm and region (2004, 2014) 93
5.1 Transport in the international mining supply chain 120
5.2 Coal and lignite imports and exports 2014 122
5.3 Average commodity and transportation costs for US coal (2008–14) 123
5.4 Historical change in transport-related innovation (1900–2015) 127
5.5 Country of origin of mining transport patents (1990–2015) 130
5.6 Mining transport patents by transport mode (1970–2015) 131
5.7 Transport patents in automation 135
5.8 Transport automation innovation per country 136
5.9 Where does MTI source technology? 137
5.10 Which sectors make use of mining transport technologies? 138
6.1 Number of clean mining patents over time in total sample (left panel) and share of clean patents among all mining patents (right panel) 149
6.2 Decomposition of the OECD EPS index 151
6.3 Market and nonmarket EPS 153
6.4 Mining patenting and lagged EPS 159
6.5 Mineral price index (MPI) 159
7.1 Private R&D expenditure in mining and quarrying in EU countries and World Bank Metals and Minerals Price Index 175
7.2 Mineral exploration expenditure by commodity and nonferrous metals price index 176
7.3 De-trended Metals and Minerals Price Index and different cycles components 181
7.4 Number of patent families and R&D expenditure in the mining sector 183
7.5 Country exposure to mining sector rents 184
7.6 Mining and METS firms innovation relative specialization, by country and mining technology 185
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.7</td>
<td>Mining price, quantity and innovation co-evolution (1960–2015)</td>
<td>185</td>
</tr>
<tr>
<td>7.8</td>
<td>Mining price, quantity and innovation cycle decomposition (1960–2015)</td>
<td>186</td>
</tr>
<tr>
<td>7.9</td>
<td>Average marginal effect of long cycle component of price index on innovation with 95% confidence intervals</td>
<td>195</td>
</tr>
<tr>
<td>7.10</td>
<td>Average marginal effect of medium cycle component of price index on innovation with 95% confidence intervals</td>
<td>196</td>
</tr>
<tr>
<td>7.11</td>
<td>Average marginal effect of short cycle component of price index on innovation with 95% confidence intervals</td>
<td>196</td>
</tr>
<tr>
<td>8.1</td>
<td>Leading producing companies in Brazil (2015)</td>
<td>203</td>
</tr>
<tr>
<td>8.2</td>
<td>Innovative activities developed by extractive companies and degree of importance</td>
<td>208</td>
</tr>
<tr>
<td>8.3</td>
<td>Mining patents, by type of applicant (2000–15)</td>
<td>215</td>
</tr>
<tr>
<td>8.4</td>
<td>Mining patent applicants, by mining technology groups</td>
<td>215</td>
</tr>
<tr>
<td>8.5</td>
<td>Mining patents filed by METS, by country of origin (2000–15)</td>
<td>216</td>
</tr>
<tr>
<td>8.6</td>
<td>Leading METS applicants (2000–15)</td>
<td>217</td>
</tr>
<tr>
<td>8.7</td>
<td>Leading applicants among mining firms (2000–15)</td>
<td>218</td>
</tr>
<tr>
<td>8.8</td>
<td>Leading contractors (2000–15)</td>
<td>222</td>
</tr>
<tr>
<td>8.9</td>
<td>Leading suppliers, by country of provision of the contract (2000–15)</td>
<td>223</td>
</tr>
<tr>
<td>8.10</td>
<td>Types of firms surveyed by products supplied</td>
<td>242</td>
</tr>
<tr>
<td>8.11</td>
<td>Sales (frequency distribution, excluding the largest four firms)</td>
<td>244</td>
</tr>
<tr>
<td>8.12</td>
<td>Employees (frequency distribution, excluding the largest four firms)</td>
<td>244</td>
</tr>
<tr>
<td>8.13</td>
<td>Type of innovation</td>
<td>245</td>
</tr>
<tr>
<td>8.14</td>
<td>Do IP registration costs affect protection decisions in Chile?</td>
<td>248</td>
</tr>
<tr>
<td>8.15</td>
<td>Does your firm have trade secrets?</td>
<td>249</td>
</tr>
<tr>
<td>8.16</td>
<td>IP instruments of apparent interest to potential exporters</td>
<td>250</td>
</tr>
<tr>
<td>9.1</td>
<td>US mining employment (1900–2017)</td>
<td>259</td>
</tr>
<tr>
<td>9.2</td>
<td>Fatalities in US mining (1900–2017)</td>
<td>260</td>
</tr>
<tr>
<td>9.3</td>
<td>USPTO-granted patents in mineral mining (three-year moving average by filing year)</td>
<td>265</td>
</tr>
<tr>
<td>9.4</td>
<td>USPTO-granted patents in mineral mining separated into safety-related and non-safety-related groups (three-year moving average by filing year)</td>
<td>266</td>
</tr>
<tr>
<td>9.5</td>
<td>USPTO-granted patents in mineral mining for refuge chambers and TTE communications</td>
<td>268</td>
</tr>
<tr>
<td>9.6</td>
<td>Schematic diagram of a wall-to-wall barrier in a passageway of a mine</td>
<td>271</td>
</tr>
<tr>
<td>9.7</td>
<td>Through-the-earth (TTE) emergency tracking and communication system</td>
<td>272</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

10.8 Distributions of similarity scores for NIOSH granted patents in four mutually exclusive groups (mineral mining, safety-related mineral mining, TTE communications and refuge chambers) 273
11.1 Canadian patenting activity in the mining sector between 1990 and 2015 286
11.2 Top Canadian mining firms and METS and their associated mining sector category, 1990–2015 288
11.3 Priority country share for top Canadian mining firms and METS 289
11.4 Priority country share for all Canadian mining firms and METS 290
11.5 All mining patent families assigned to Canadian mining firms and METS 291
11.6 Canadian patenting activity by mining category between 1990 and 2015 293
11.7 Relative Specialization Index (RSI) 294
11.8 Patent families assigned to Canadian assignees in the exploration category 296
11.9 Collaborations and their distribution by mining sector category between 1990 and 2015 297
11.10 Collaboration map involving mining firms and METS 299
11.11 Canadian mining industry clusters 301
11.12 Geographical clusters of inventive activity in Canada 302
12.1 Patent families of Australian origin, by priority year, 1997–2015 311
12.2 Top Australian patent filers 313
12.3 Australian entities who file patents, by entity type 313
12.4 Patent filings by Australians, by mining technology 314
12.5 Patent filings by Australians, by mining technology, by priority year, 1997–2015 315
12.6 Jurisdictions in which Australian innovators seek patent protection 319
12.7 Australian patent filing collaboration by entity type 320
12.8 Top Australian collaborators in patent filings 321
12.9 Australian patent filings by CRCs 321
12.10 Mining sector expenditure in the R&D Tax Incentive, 2000–1 to 2015–16 324
12.11 Mining sector companies by entity size, 2000–01 to 2015–16 325
12.12 Comparison of mining sector industry subdivision trends under the R&D Tax Incentive by industry subdivision, 2000–1 to 2015–16 326
12.13 Mining sector R&D expenditure and patent filings for R&D Tax Incentive companies, 2000–01 to 2015–16 327
LIST OF FIGURES

12.14 Mining sector performance under the R&D Tax Incentive by State and Territory, 2000–1 to 2015–16 328
12.15 Patent filings into Australia, by priority year, 1997–2015 330
12.16 RBA Index of Commodity Prices, 1997–2015 331
12.17 Mining sector profits as a share of nominal GDP, 1997–2015 331
12.18 Australian investment in mining as a percentage of GDP, 1997–2015 332
12.19 Patent filings into Australia by mining technology 332
12.20 Patent filings into Australia by applicant origin 333
12.21 Top applicants filing patents into Australia in the mining sector 335
12.22 International collaboration on patent filings into Australia in the mining sector 336
12.23 Collaboration on patent filings into Australia in the mining sector by technology 337
12.24 Collaboration on patent filings into Australia by technology by country 337
TABLES

2.1 Mining firms with and without patents  page 47
3.1 Mining MNEs in UNCTAD Top 100 ranking of the largest global MNEs  56
4.1 Natural resources matter for GDP and trade for emerging and Latin American countries  91
5.1 Average distance and Capesize vessel shipping price to Port of Qingdao, China  124
6.1 Patent classification of clean mining patents  148
6.2 Top countries as ranked according to their share of clean patents in total mining patents, 1990–2015  150
6.3 Control variables  157
6.4 Baseline results  160
6.5 Results – Impact of market vs. nonmarket EPS  163
6.6 Results – Impact of individual policy instruments  164
6A Summary statistics of key variables  170
6B Robustness best of baseline estimation, using further lags and moving-average definition  171
7.1 Characteristics of mining and METS firms  177
7.2 Effect on innovation and access to finance of price change  179
7.3 Time series estimation  187
7.4 Time series estimation, different mining categories  189
7.5 Time series estimation, different mining categories, decomposed price cycles  190
7.6 Time series estimation, mining vs METS firms  191
7.7 Panel estimation  192
7.8 Panel estimation, using country-specific price index  193
8.1 Brazilian ore production (2015)  205
8.2 Mining sector challenges and technological demands  209
8.3 Patents applications: 2000–15  214
8.4 Coapplications and foreign inventors, by mining technology  219
8.5 Research sample (technology import contracts) (2000–15)  220
8.6 Technology import contracts by type, by contractor and by supplier (2000–15)  221
LIST OF TABLES

8.7 Mining firm contractors (subsidiaries and parent companies) 223
9.1 Share of global production and reserves (% 2015) 233
9.2 Percentage of firms that innovate (mining suppliers vis-à-vis the industry and the economy) 236
9.3 Mining-related patents filed in the Chilean Patent Office 238
9.4 Major 10 nonresident (NR) firms filing patents in Chile, by country of origin 240
9.5 Descriptive statistics (in US dollars) 243
9.6 IP applications filed in the Chilean Patent Office and abroad, by instrument (%) 247
9.7 Questions on IP practices and regulation (%) 247
9.8 Innovating firms’ reasons for not protecting innovations (%) 248
10.1 MINER Act on health outcomes, 1995–2014 275
12.1 Mining patent filings by Australians, by technology and entity type 316
12.2 Mining support service patent filings by Australians, by technology and entity type 318
BOXES

3.1 Tracking R&D Internationalization in Mining FDI Using Patent Statistics page 73

9.1 Codelco’s Innovation Strategy (The Role of Codelco Tech) 238
CONTRIBUTORS

ROHAN AMBURLE is acting Director of Data Front Door and Analytics team and a former patent analyst at IP Australia, Australia.

MAXWELL ANDERSEN is an international economics researcher at the Graduate Institute of International and Development Studies’ Center for International Environmental Studies in Geneva, Switzerland.

MAZAHIR BHAGAT is a data scientist at the Canadian Intellectual Property Office (CIPO), Canada.

DOMENICA BLUNDI is the coordinator of partnerships and management of RD&I at Vale S.A., Brazil.

CATRIONA BRUCE is Head of the Patent Analytics Hub at IP Australia, Australia.

BRUNO CASELLA is Senior Economist at the Trends and Data Section in the Division for Investment and Enterprise of the United Nations Conference on Trade and Development (UNCTAD), Switzerland.

SERGIO M. PAULINO DE CARVALHO is an intellectual property senior specialist at the Brazilian National Institute of Industrial Property (INPI), Brazil.

ELIAS COLLETTE is Director of Business Improvement Services and Chief of the Economic Research and Strategic Analysis unit at the Canadian Intellectual Property Office (CIPO), Canada.

ALICA DALY is Senior Policy Officer on Artificial Intelligence and Data at the World Intellectual Property Organization (WIPO), Switzerland, and former Research Fellow in the Innovation Economics Section at the Department of Economics and Data Analytics of WIPO.

FRANCESCO DIONORI is Chief of Transport Networks and Logistics Section of the United Nations Economic Commission for Europe (UNECE), Switzerland.

BAHARAK COURTNEY DOAGOO is a fellow at the Centre for International Governance Innovation (CIGI) and a former
xvi

LIST OF CONTRIBUTORS

post-doctoral fellow in the International Law Research Program CIGI, Canada, and is a CIGI Fellow.

MARINA FILGUEIRAS JORGE is Chief of the Economic Affairs Advisory at the Brazilian National Institute of Industrial Property (INPI), Brazil.

JAMES FORMAN is a data scientist at Google, Inc. and a former patent examiner detaillee at the Office of the Chief Economist at the United States Patent and Trademark Office (USPTO), United States.

LORENZO FORMENTI is an associate expert at the Division of International Trade and Commodities of the United Nations Conference on Trade and Development (UNCTAD), Switzerland.

EMMA FRANCIS is an IP data expert at the World Intellectual Property Organization (WIPO), Switzerland, and former patent analyst at IP Australia, Australia.

DAVID HUMPHREYS is an honorary lecturer at the University of Dundee, Scotland, and former Chief Economist at Norilsk Nickel and Rio Tinto.

MICHIKO IIZUKA is a professor at the National Graduate Research Institute on Policy Studies (GRIPS), Japan.

AMIRA KHADR is a policy analyst at Innovation, Science and Economic Development Canada and a former research economist at the Canadian Intellectual Property Office (CIPO), Canada.

ALMA LACKEN is an Assistant Director and former patent analytics project manager at IP Australia, Australia.

GREG MALONEY is an IP searcher and analyst at the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia, and former patent analyst at IP Australia, Australia.

SEAN MARTINEAU is interim manager of IP Analytics and Data Dissemination at the Canadian Intellectual Property Office (CIPO), Canada.

MARC NEVILLE is a senior economist at the Canadian Intellectual Property Office (CIPO), Canada.

JOËLLE NOAILLY is a lecturer in International Economics and Head of Research of the Centre for International Environmental Studies (CIES) at the Graduate Institute of International and Development Studies in Geneva, Switzerland.

ANA CLAUDIA NONATO is a researcher at the Brazilian National Institute of Industrial Property (INPI), Brazil.

VITORIA ORIND is an economic affairs advisor at the Brazilian National Institute of Industrial Property (INPI), Brazil.
LIST OF CONTRIBUTORS

Claudio Bravo Ortega is an associate professor, director of the Master of Innovation and head of the Innovation, Entrepreneurship and Sustainability Group, at Adolfo Ibañez University, Chile.

Carlo Pietrobelli is a professor of economics at University Roma Tre, Italy; a professorial fellow at UNU-MERIT, The Netherlands; and an adjunct professor at Georgetown University.

Juan José Price is a researcher at the Macquarie University and the Copenhagen Business School, Denmark.

Julio D. Raffo is Head of the Innovation Economics Section at the Department of Economics and Data Analytics of the World Intellectual Property Organization (WIPO), Switzerland.

Asrat Tesfayesus is a transfer pricing senior consultant at Deloitte US and former economist at the Office of the Chief Economist at the United States Patent and Trademark Office (USPTO), United States.

Andrew A. Toole is Chief Economist at the United States Patent and Trademark Office (USPTO), United States; and a research associate at the Centre for European Economic Research (ZEW), Germany.

Deanna Trainham is a spatial data analyst at the Australian Government Department of Industry, Science, Energy and Resources, and a former data analyst at IP Australia, Australia.

Giulia Valacchi is an external consultant and former research fellow in the Innovation Economics Section at the Department of Economics and Data Analytics of the World Intellectual Property Organization (WIPO), Switzerland.

Fernando Vargas is Competitiveness, Technology, and Innovation Specialist of the Inter-American Development Bank (IADB).

Fernando Vargas is Competitiveness, Technology, and Innovation Specialist of the Inter-American Development Bank (IADB).

Felipe Veiga Lopes is Head of Statistics Division at the Brazilian National Institute of Industrial Property (INPI), Brazil.

Maryam Zehtabchi is an economic officer at the Innovation Economics Section at the Department of Economics and Data Analytics of the World Intellectual Property Organization (WIPO), Switzerland.
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Alica Daly, David Humphreys, Julio Raffo and Giulia Valacchi

xviii
FOREWORD

CARSTEN FINK
Chief Economist
World Intellectual Property Organization

BENJAMIN MITRA-KAHN
Chief Economist & General Manager
IP Australia

Innovations in mining do not make the same headlines as innovations in, say, electronics and cars. That is partly because it does not immediately lead to fancy new consumer products but, more deeply, it reflects a lack of appreciation for the importance of mining innovation. The productivity of extracting minerals from the earth has vastly improved since steam engines were introduced to clear water out of mines more than 200 years ago. The extraction and refinement of minerals now spans many fields of research and technology, from under-sea mining robots to chemical refinement methods. Raw mineral materials are at the root of industrial supply chains and the ability to supply ever-larger quantities of such materials has been a key contributor to the growth of the world economy. What’s more, mining innovations have contributed to improved public health, by enhancing the safety of mining workers and limiting their exposure to harmful substances. Mining innovations have also reduced the adverse environmental impact of extraction activities, to which societies have rightly paid increasing attention.

Looking into the future, the importance of mining innovation will be no less important. With growing populations and growing economies, the demand for mineral products is set to increase. New “upstream” technologies generate new demands for certain minerals – such as lithium for battery-powered vehicles. Yet digging minerals from the earth is getting harder. The quality of existing mineral reserves is declining, rendering their extraction more difficult and complex. At the same time, the need to protect the environment and prevent climate change has become an even greater imperative. Technological innovation holds the key to addressing these challenges. There is promising potential in a number of technology fields relevant to mining, ranging from
mechanical engineering to biotechnology. New digital technologies promise to take the automation of mining tasks to a new level.

Opportunities for technological progress are hard to predict. Only time will tell how successful future mining innovations will be in raising mining productivity. There is an important role for governments in shaping the innovation ecosystem in which opportunities for technological progress are realized. Companies operating in the mining sector are at the forefront of innovation. Their incentives to innovate depend on a wide range of policies, including the tax treatment of R&D investments, the protection of intellectual property rights, environmental regulations, and safety standards. In addition, companies draw on knowledge generated by academia and specialized research institutes, many of which are publicly funded.

Charting a government strategy in support of mining innovation requires solid evidence on the effectiveness of different policy approaches as well as their wider pros and cons. Unfortunately, just as mining innovation itself is under-appreciated, there is a dearth of economic research for policymakers to use as an empirical basis for decision-making. It is with this background in mind that IP Australia and WIPO joined forces in 2017 to contribute to a better understanding of the nature and drivers of mining innovation. Patent data offered an obvious entry point to study mining-related technologies, but it soon became clear that a broader approach was needed to study this field of innovation. In addition, other countries expressed interest in pursuing this line of research, leading to a set of studies that eventually gave rise to this edited book volume. Anyone interested in the multifaceted dimensions of mining innovation will find this book worthwhile reading. We hope that policymakers in particular will draw inspiration from the evidence presented in the various chapters to promote policies that contribute to vibrant mining innovation and, ultimately, to a more productive mining sector that supports economic growth as well as broader societal objectives.