



UNITED NATIONS
UNIVERSITY

UNU-MERIT

Working Paper Series

#2021-048

**Identifying technological trajectories in the mining sector using
patent citation networks**

Enrico Alessandria

Published

2021

Maastricht Economic and social Research institute on Innovation and Technology (UNU-MERIT)

email: info@merit.unu.edu | website: <http://www.merit.unu.edu>

Boschstraat 24, 6211 AX Maastricht, The Netherlands

Tel: (31) (43) 388 44 00

UNU-MERIT Working Papers

ISSN 1871-9872

**Maastricht Economic and social Research Institute on Innovation and Technology
UNU-MERIT**

UNU-MERIT Working Papers intend to disseminate preliminary results of research carried out at UNU-MERIT to stimulate discussion on the issues raised.



The UNU-MERIT WORKING Paper Series

- 2021-01 *Transformation towards sustainable development goals: Role of innovation* by Michiko Iizuka and Gerald Hane
- 2021-02 *Access to social protection for platform and other non-standard workers: A literature review* by Tamara A. Kool, Giulio Bordon and Franziska Gassmann
- 2021-03 *Labour-augmenting technical change data for alternative elasticities of substitution, growth, slowdown, and distribution dynamics* by Thomas Ziesemer
- 2021-04 *Democracy and COVID-19 Outcomes* by Gokhan Karabulut, Klaus F. Zimmermann, Mehmet Huseyin Bilgin and Asli Cansin Doker
- 2021-05 *Patent landscaping using 'green' technological trajectories* by Önder Nomaler & Bart Verspagen
- 2021-06 *Macroeconomic stimulus packages and income inequality in developing countries: Lessons from the 2007-9 Great Recession for the Covid-19 crisis in South Africa* by Alexis Habiyaemye, Peter Jacobs, Olebogeng Molewa and Pelontle Lekomanyane
- 2021-07 *Deepening or delinking? Innovative capacity and global value chain participation in the ICT sectors* by Rasmus Lema, Carlo Pietrobelli, Roberta Rabellotti and Antonio Vezzani
- 2021-08 *COVID-19 policy responses, mobility, and food prices: Evidence from local markets in 47 low to middle income countries* by Stephan Dietrich, Valerio Giuffrida, Bruno Martorano and Georg Schmezer
- 2021-09 *Attitudes towards inequality in Brazil: An analysis of a highly unequal country* by Cintia Denise Granja and Ana Maria Carneiro
- 2021-10 *Mobile phones and HIV testing: Multi-country evidence from sub-Saharan Africa* by Francesco Iacolla and Nyasha Tirivayi
- 2021-11 *What makes a productive Ph.D. student?* by Alberto Corsini, Michele Pezzoni and Fabiana Visentin
- 2021-12 *Do institutions and ideology matter for economic growth in Latin America in the first two decades of the 21st century?* by Pamela L. Navarrete Gallo and Jo Ritzen
- 2021-13 *How social assistance affects subjective Well-being: Lessons from Kyrgyzstan* by Franziska Gassmann, Bruno Martorano and Jennifer Waidler
- 2021-14 *Do pandemics lead to rebellion? Policy responses to COVID-19, inequality, and protests in the USA* by Francesco Iacolla, Patricia Justino and Bruno Martorano
- 2021-15 *Foreign R&D spillovers to the USA and strategic reactions* by Thomas H.W. Ziesemer
- 2021-16 *Will the AI revolution be labour-friendly? Some micro evidence from the supply side* by G. Damioli, V. Van Roy, D. Vertesy and M. Vivarelli
- 2021-17 *The influence of value-chain governance on innovation performance: A study of Italian suppliers* by Emanuele Brancati, Carlo Pietrobelli and Caio Torres Mazzi
- 2021-18 *Does entrepreneurship increase the chances of the poor?* by Omar Rodríguez Torres
- 2021-19 *How different are necessity and opportunity firms? Evidence from a quantile analysis of the Colombian microenterprise sector* by Omar Rodríguez Torres
- 2021-20 *A taxonomy of European innovation clubs* by Ariel L. Wirkierman, Tommaso Ciarli and Maria Savona
- 2021-21 *Supporting academic advising through self-directed, blended learning* by Mindel van de Laar, Katerina N. Triantos and Lutz F. Krebs
- 2021-22 *Powering structural transformation and productivity gains in Africa: The role of global value chains and resource endowments* by Solomon Owusu

- 2021-23 A map of the fractal structure of high-tech dynamics across EU regions by Ariel L. Wirkierman, Tommaso Ciarli and Maria Savona
- 2021-24 *How does market competition affect firm innovation incentives in emerging countries? Evidence from Latin American firms* by Jose Miguel Benavente and Pluvia Zuniga
- 2021-25 *The effectiveness of innovation policy and the moderating role of market competition: Evidence from Latin American firms* by Jose Miguel Benavente and Pluvia Zuniga
- 2021-26 Knowledge transfer activities and conditions for impact in Bulgarian public research institutions: A survey-based diagnostic by Anwar Aridi, Daniel Querejazu and Pluvia Zuniga
- 2021-27 *Religiosity, smoking and other addictive behaviours* by Monica Roman, Klaus F. Zimmermann and Aurelian-Petrus Plopeanu
- 2021-28 *Women's empowerment in Colombia: A multidimensional approach* by Esmeralda Rodríguez Guerrero, Zina Nimeh and Andrea Franco Correa
- 2021-29 *Simulating the impact of a raise in education salaries on economic growth in Peru* by Luciano Paredes Chervellini and Jo Ritzen
- 2021-30 *Social networks and agricultural performance: A multiplex analysis of interactions among Indian rice farmers* by Bruhan Konda, Mario González-Sauri, Robin Cowan, Yashodha Yashodha and Prakashan Chellattan Veetill
- 2021-31 *Positioning firms along the capabilities ladder* by Alex Coad, Nanditha Mathew and Emanuele Pugliese
- 2021-32 Political polarization and the impact of internet and social media use in Brazil by Lorena Giuberti Coutinho
- 2021-33 Women's mobile phone access and use: A snapshot of six states in India by Lina Sonne
- 2021-34 Economic development, weather shocks and child marriage in South Asia: A machine learning approach by Stephan Dietrich, Aline Meysonnat, Francisco Rosales, Victor Cebotari and Franziska Gassmann
- 2021-35 Longing for which home: Evidence from global aspirations to stay, return or migrate onwards by Els Bekaert, Amelie F. Constant, Killian Foubert and Ilse Ruysen
- 2021-36 *The impact of research independence on PhD students' careers: Large-scale evidence from France* by Sofia Patsali, Michele Pezzoni and Fabiana Visentin
- 2021-37 *Does commonness fill the common fund? Experimental evidence on the role of identity for public good contributions in India* by Bruhan Konda, Stephan Dietrich and Eleonora Nillesen
- 2021-38 *Demand-led industrialisation policy in a dual-sector small balance of payments constrained economy* by Önder Nomaler, Danilo Spinola and Bart Verspagen
- 2021-39 *The political geography of cities* by Richard Bluhm, Christian Lessmann and Paul Schaudt
- 2021-40 *Overcoming a legacy of racial discrimination: Competing policy goals in South African academia* by Robin Cowan, Moritz Müller, Alan Kirman and Helena Barnard
- 2021-41 *Financial development and small firms' tax compliance in Sub-Saharan Africa* by Racky Balde
- 2021-42 *Wage effects of global value chains participation and position: An industry-level analysis* by Gideon Ndubuisi and Solomon Owusu

- 2021-43 *Mobile money adoption and entrepreneurs' access to trade credit in the informal sector* by Godsway Korcu Tetteh, Micheline Goedhuys, Maty Konte and Pierre Mohnen
- 2021-44 *Labour-saving automation and occupational exposure: a text-similarity measure* by Fabio Montobbio, Jacopo Staccioli, Maria Enrica Virgillito and Marco Vivarelli
- 2021-45 *Is there job polarization in developing economies? A review and outlook* by Antonio Martins-Neto, Nanditha Mathew, Pierre Mohnen and Tania Treibich
- 2021-46 *How education and GDP drive the COVID-19 vaccination campaign* by Vu M. Ngo, Klaus F. Zimmermann, Phuc V. Nguyen, Toan L.D. Huynh and Huan H. Nguyen
- 2021-47 *Global dynamics of Gini coefficients of education for 146 countries updated to 1950-2015* by Thomas Zieseemer
- 2021-48 *Identifying technological trajectories in the mining sector using patent citation networks* by Enrico Alessandria