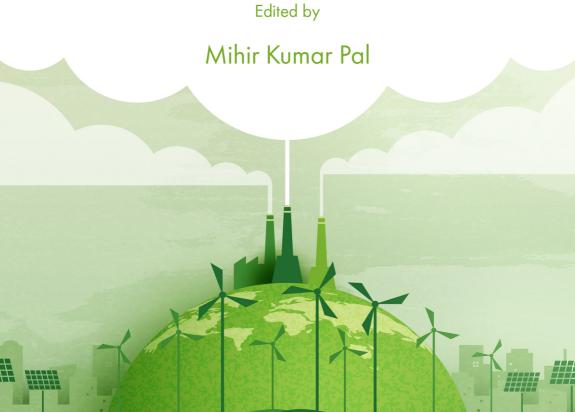
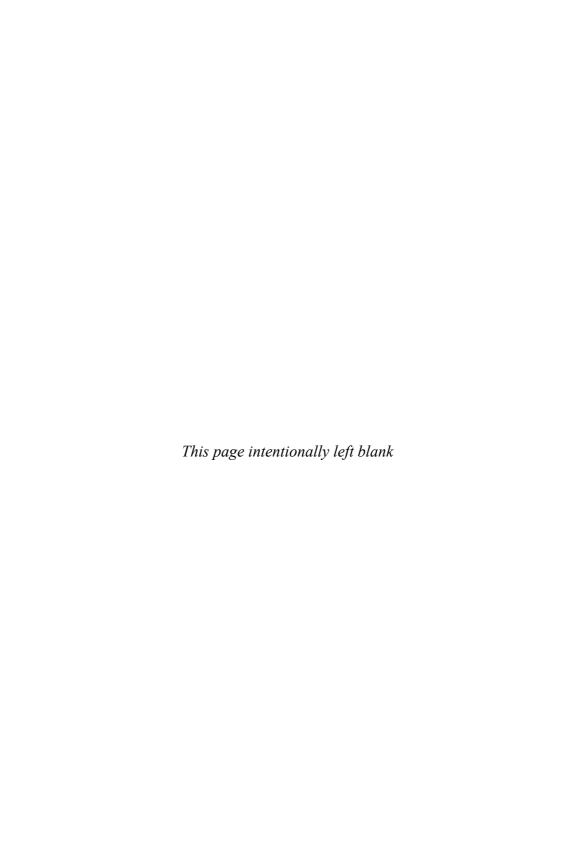
The Impact of Environmental Emissions and Aggregate Economic Activity on Industry

Theoretical and Empirical Perspectives



The Impact of Environmental Emissions and Aggregate Economic Activity on Industry



The Impact of Environmental Emissions and Aggregate Economic Activity on Industry: Theoretical and Empirical Perspectives

EDITED BY

MIHIR KUMAR PAL

Vidyasagar University, India



Emerald Publishing Limited Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2023

Editorial matter and selection © 2023 Mihir Kumar Pal. Individual chapters © 2023 The authors.

Published under exclusive licence by Emerald Publishing Limited.

Reprints and permissions service

Contact: permissions@emeraldinsight.com

No part of this book may be reproduced, stored in a retrieval system, transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the publisher or a licence permitting restricted copying issued in the UK by The Copyright Licensing Agency and in the USA by The Copyright Clearance Center. Any opinions expressed in the chapters are those of the authors. Whilst Emerald makes every effort to ensure the quality and accuracy of its content, Emerald makes no representation implied or otherwise, as to the chapters' suitability and application and disclaims any warranties, express or implied, to their use.

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN: 978-1-80382-578-6 (Print) ISBN: 978-1-80382-577-9 (Online) ISBN: 978-1-80382-579-3 (Epub)

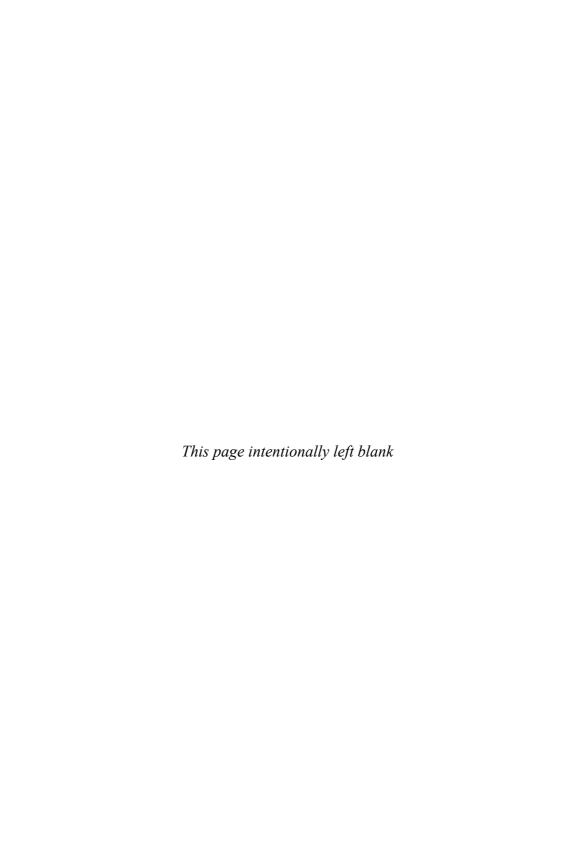


ISOQAR certified Management System, awarded to Emerald for adherence to Environmental standard ISO 14001:2004.

Certificate Number 1985



Dedicated to
My Parents and Family



Contents

List of Tables and Figures	X
About the Authors	xiv
Foreword	xxi
Acknowledgements	xxiii
Introduction	1
Section I: Theoretical Perspectives	
Chapter 1 Carbon Capturing Smart Construction Industry Model to Foster Green and Sustainable Total Factor Productivity Growth of Industries Begum Sertyesilisik	11
Chapter 2 Trade-Off Between Environmental Emission and Consumption and Some Related Issues: An Optimal Growth-Theoretic Analysis	
Mainak Bhattacharjee and Debashis Mazumdar	25
Chapter 3 Politics, Development and Environment: Question of Sustainability Md. Saifullah Akon, Md. Juel Mia and Rathindra Nath Biswas	39
Chapter 4 Environmental Emission, Green Technology and International Trade Nilendu Chatterjee and Tonmoy Chatterjee	53
Chapter 5 The Role of Nuclear Energy to Reduce Carbon Emission Serhat Yüksel, Hasan Dinçer, Çağatay Çağlayan and Gülsüm Sena Uluer	67

Chapter 6 Politic, Economic and Environmental Dimensions	
of Water Resources: The Jordan Perspective	
Egemen Sertyesilisik and Mehmet Akif Ceylan	79
Section II: Empirical Perspectives	
Chapter 7 The Influence of Energy Consumption, Economic	
Growth, Industrialisation and Corruption on Carbon Dioxide	
Emissions: Evidence from Selected Asian Economies	
Sarbapriya Ray, Ishita Aditya and Mihir Kumar Pal	93
Chapter 8 Economics of Environmental Emission:	
A Theoretical Appraisal on Solovian Line and an	
Empirical Overhaul	
Mainak Bhattacharjee, Sanghita Ghosh and Dipti Ghosh	111
Chapter 9 Long-run and Short-run Linkages Between	
Efficiency of Energy Use in National Output and Carbon	
Emission: Analysis for the Panel of South Asian Nations	
Imran Hussain, Swarup Samanta and Ramesh Chandra Das	125
Chapter 10 People's Awareness on Improvement in	
Environmental Quality in the Industrial Belts of West	
Bengal: An Assessment Through Contingent Valuation Method	
Nilendu Chatterjee	139
Chapter 11 A Time Series Analysis of Productivity Growth	
and Environmental Emission in Indian Pharmaceutical Industry	
Md Rakibul Hasan, Mihir Kumar Pal and Pinki Bera	155
Chapter 12 Globalisation and Carbon Emission: Lessons	
from the Developing Economies	
Madhabendra Sinha	169
Chapter 13 Does Air Pollution Affect Labour Productivity	
in Indian Manufacturing? Evidence from State-level Data	
Susobhan Maiti and Chandrima Chakraborty	183
Chapter 14 Promoting Climate-Smart Agriculture in India:	
Emerging Pathways for Growth and Sustainability	
Amartya Pani and Pulak Mishra	195

Chapter 15 Impact of Environmental Regulations on Inward FDI in Emerging Countries: A Static Panel Data Approach	
Debabrata Mukhopadhyay and Dipankar Das	215
Chapter 16 Economic, Environmental and Social: Three	
Components to Measure the Perception of Sustainable Development	
Enrico Ivaldi, Andrea Ciacci and Riccardo Soliani	229
Enrico Ivalal, Andrea Clacci and Riccardo Soliani	229
Chapter 17 Impact of Pollution and Economic Growth on the	
Maldives and Bangladesh: Interrogative Economic	
Development and Environmental Governance	
Debasish Nandy	249
Debasish Nahay	249
Chapter 18 Measuring TFPG and Its Components Using	
Frontier Approaches: A Study of 4-Digit Manufacturing	
Industries of Chemical and Chemical Products in India	
	261
Prasanta Kumar Roy and Mihir Kumar Pal	261
Chapter 10. The Implication of Dellution Control Acta &	
Chapter 19 The Implication of Pollution Control Acts &	
Protocols and COVID-19 on Air Quality: A Case Study	
of Mumbai, India	
Shrabanti Maity, Ummey Rummana Barlaskar and	
Nandini Ghosh	277
Chapter 20 Smart City Mission and Urban Environmental	
Sustainability in India	
Daisy Singh and Pulak Mishra	291
Chapter 21 Energy Intensity, Capacity Utilisation and	
Total Factor Productivity Growth of Indian Iron and Steel	
Industry: A Cost Function Approach: 1980–1981 to 2016–2017	
Mihir Kumar Pal, Pinki Bera and Md Rakibul Hasan	313
Chapter 22 A Joyless City: Long-Run Trend of Air Pollution	
Levels of Kolkata, India	
Asish Kumar Pal and Atanu Sengupta	331
Chapter 23 Emission Intensity of Indian Unorganised	
Manufacturing Enterprises: Effect of Firm Characteristics	
and Capital Intensity	
Akash Dandapat and Pinaki Das	343
Index	357
ex e	

List of Tables and Figures

Figures		
Fig. 1.1.	3R+U of the CO ₂ Emissions.	14
Fig. 1.2.	Integrated Usage of Smart Technologies, Materials and	
	Processes with Carbon Capturing Technologies, Materials	
	and Processes.	15
Fig. 1.3.	Carbon Capturing Smart Construction Industry Model	
C	to Support Green and Sustainable Total Factor	
	Productivity Growth of Industries.	16
Fig. 2.1.	Consumption-Emission Dynamics in Case of Single	
	Equilibrium.	32
Fig. 2.2.	Consumption-Emission Dynamics in Case of Multiple	
	Equilibrium.	32
Fig. 2.3.	Dynamics of Per Capita Output Growth Rate (g) and	
	Emission (P) .	34
Fig. 2.4.	Dynamics of Per Capita Output Growth Rate (g) and	
	Emission (<i>P</i>).	34
Fig. 4.1.	Equilibrium Level of Output of Non-Polluting Sector (X_M)	
	and Domestic Rate of Return on Green Capital (R).	60
Fig. 4.2.	Shift in Equilibrium Level of Output of Non-Polluting	
	Sector (X_M) and Domestic Rate of Return on Green	
	Capital (R).	60
Fig. 6.1.	Interaction Between Industrial Growth and	
	Environmental Pollution and Their Effects on	
	Jordan's Water Resources and Economy.	82
Fig. 6.2.	Energy and Water as the Main Pillars for the	
	Economic Growth.	83
Fig. 8.1.	Dynamics of Emission.	120
Fig. 10.1.	Flowchart for Different Bid Groups.	146
Fig. 11.1.	TFPG for Different Period Using Two Methods.	165
Fig. 11.2.	Trend Growth of TFPG of Different Periods Using	
	Method 1.	165
Fig. 11.3.	Trend Growth of TFPG of Different Periods Using	
	Method 2.	166
Fig. 11.4.	Yearly Fuel Consumption for Per Unit of Output.	166

Fig. 13.1.	Different Pollutants in the Sample States for the Year 2015.	188
Fig. 13.2.	Different Pollutants in the Sample States for the Year 2016.	189
Fig. 13.3.	Different Pollutants in the Sample States for the Year 2017.	189
Fig. 13.4.	Different Pollutants in the Sample States for the Year 2018.	190
Fig. 13.5.	Different Pollutants in the Sample States for the Year 2019.	190
Fig. 14.1.	Pathways of CSA.	199
Fig. 14.2a a	and 2b. Structure of Staggered Trenches With Vegetative Cover.	202
Fig. 14.3.	Impact of Irrigation on Different on Agriculture and	
	Local Ecology.	205
Fig. 15.1.	Per Capita CO ₂ Emission (Measures in Metric Tonnes	
	Per Capita) in Emerging Countries During 2000–2015.	221
Fig. 15.2.	Movement of Cross-country Variation in Inward FDI	
	Over 2000–2015 in Terms of Standard Deviation.	223
Fig. 15.3.	Movement of Cross-country Variation in Inward FDI	
	Over 2000–2015 in Terms of Coefficient of Variation.	223
Fig. 16.1.	Geographic Distribution of MPI _{EC} , MPI _{EN} , MPI _S	
	and MPI _{ECENS} .	241
Fig. 19.1.	AQI From 01.01.2011 to 27.11.2020.	282
Fig. 19.2.	Break Point Determined by CUSUMQ Test.	284
Fig. 20.1.	Methodology Followed For the Study.	301
Fig. 20.2a.	Average Frequency of Cities (%) Proposing in	
E: 20.21	Different Capitals.	302
Fig. 20.2b.	Average Share Proposed (%) in Different Capitals	202
E: 20.2	Out of Total Funds Allocated by the Selected Cities.	302
Fig. 20.3.	The Conceptual Framework of the Proposed Study.	305
Fig. 22.1.	Trend of Major Vehicular Pollutants in Kolkata.	337
Fig. 22.2.	Season-wise SPM Level in Kolkata.	337
Fig. 22.3.	Season-wise RPM Level in Kolkata.	338
Fig. 22.4.	Season-wise SO ₂ Level in Kolkata.	339
Fig. 22.5.	Season-wise NO ₂ Level in Kolkata.	339
Fig. 23.1.	CO ₂ Emission (in Million Tons) by Indian Unorganised	251
	Manufacturing Industries, 2005–2006 to 2015–2016.	351
Tables		
	Communication Design	06
Table 7.1.	Summary of Literature Review.	96
Table 7.2.	Description of Dependent and Independent Variables	00
Table 7.2	and List of 10 Asian Economies Surveyed.	99
Table 7.3.	First Generation Panel Unit-Root Tests. Padroni Pacidual Caintegration Test and Vac Pacidual	101
Table 7.4.	Pedroni Residual Cointegration Test and Kao Residual	102
Table 7.5	Cointegration Test.	102 103
Table 7.5. Table 7.6.	Johansen Fisher Panel Cointegration Test. Individual Cross-Section Cointegration Results.	103
Table 7.0.	Panel Cross-Section Heteroscadasticity LR Test.	104
		104
Table 7.8.	Breusch–Godfrey Serial Correlation LM Test.	103

Table 7.9.	Panel EGLS.	105
Table 7.10.	Pairwise Granger Causality Tests.	106
Table 8.1.	The Results of the Aforementioned Regression.	121
Table 9.1.	Panel Unit Root and Panel Cointegration Test Results.	132
Table 9.2.	Lag Length Selection Criteria Test Results.	133
Table 9.3.	The Estimated Coefficients of VECM and the Wald	
	Test Results for Equation-1 and Equation-2.	136
Table 10.1.	Income Distribution of the Surveyed Households.	145
Table 10.2.	Description of Independent Variables Used in the Model.	147
Table 10.3.	Results of the Logit Model (Barrackpore and Howrah).	149
Table 10.4.	Estimation of Mean WTP for an Improvement in Air	
	Quality (DC Model Under Closed-ended Referendum).	150
Table 10.5.	Regression Results of Open-ended Referendum.	150
Table 11.1.	Results of ADF and Phillips–Perron Test Stationarity.	163
Table 11.2.	Results of Johansen Type of Co-integration Test.	164
Table 12.1.	Results of Panel Unit Root Tests.	176
Table 12.2.	Results of Dynamic Panel GMM Estimations.	177
Table 13.1.	Estimated Result of Panel Regression and the Marginal	
	Effect of the Explanatory Variables.	191
Table 14.1.	Areas and Actions for CSA in Different Countries.	198
Table 14.2.	Soil and Slope-based Staggered Trench Structure.	203
Table 14.3.	Soil Characteristics in Two Selected Blocks of Jhargram	
	District.	204
Table 14.4.	Scaling Up CSA: Technology and Policy Framework.	206
Table 15.1.	Descriptive Statistics in Emerging Countries for the	
	Year 2015.	222
Table 15.2.	Static Panel Results.	224
Table 16.1.	Economic, Environmental and Social Variables.	233
Table 16.2.	Economic Dimension MPI _{EC} .	236
Table 16.3.	Environmental Dimension MPI _{EN} .	237
Table 16.4.	Social Dimension MPI _S .	238
Table 16.5.	Aggregate Results of the Three Dimensions	
	(MPI _{ECENS}).	239
Table 16.6.	Kendall Rank Correlation Coefficients.	242
Table 16.7.	Ranks of MPI's Scores.	243
Table 16.8.	Robustness of MPI. Average Shift in Countries When	
	Excluding an Indicator.	244
Table 18.1.	MLE of Parameters of the Stochastic Production	
	Frontier and Inefficiency Effects.	268
Table 18.2.	TEC, TP, SC and TFPG.	270
Table 19.1.	Summary Statistics of the AQI of Mumbai, India.	279
Table 19.2.	Unit Root Test of the AQI of Mumbai, India.	283
Table 19.3.	Growth Rate of the AQI of Mumbai, India.	286
Table 20.1.	Decadal Status of Urban Development Programmes	
	in India From 1991 to 2019	296

Table 20.2.	Overview of Urban Development Programmes in	
	India (1979–2015).	298
Table 20.3.	Attributes of the Five Capitals in SLA Framework	
	and the City Development Projects Under SCM.	300
Table 20.4.	Extent of Fund Allocation for Creation of Different	
	Capitals in Selected Cities of India.	303
Table 20.5.	Descriptive Statistics of Table 20.4.	306
Table 20.6.	City-wise Incidence and Extent of Fund Allocation in	
	Projects Related To Natural Capital.	307
Table 21.1.	Definition of Variables in This Study.	320
Table 21.2.	ADF and PP Unit Root Tests, Individual Variables.	322
Table 21.3.	Results of Johansen Cointegration Test.	326
Table 21.4.	Estimates of Productivity and Its Components, EI,	
	CU (Annual Average): Indian Iron and Steel Industry.	326
Table 21.5.	Results of Granger Causality Test.	327
Table 23.1.	Growth Rate (Per Annum) of Number, Employment	
	and GVA of Indian Unorganised Manufacturing	
	Industries, 2005–2006 to 2015–2016.	349
Table 23.2.	Energy Intensity and CO, EI of Indian Unorganised	
	Manufacturing Industries, 2005–2006 and 2015–2016.	350
Table 23.3.	Determinants of CO ₂ EI of Indian UMEs, 2005–2006	
	to 2015–2016.	352

About the Authors

Ishita Aditya, is an Associate Professor, Dept. of Political Science, Bejoy Narayan Mahavidyalaya, Hooghly, West Bengal, India. She has published a good number of research articles in reputed journals and books.

Md. Saifullah Akon, is an Assistant Professor in Japanese Studies at the University of Dhaka, Bangladesh. He has presented a good number of papers in international conferences held in Bangladesh, India, Indonesia and Thailand. He has successfully participated in a short course winter program at Sophia University, Tokyo, Japan in January 2019. His areas of interest include foreign policy, security, Japan-South Asia relations, and disaster governance.

Ummey Rummana Barlaskar is a Research Scholar of the Economics Department of Assam University. Her areas of interest are health economics, human development and development economics. She has published eight papers in different international and national journals and edited books including *BMJ Public Health*, *Development in Practice*, etc.

Pinki Bera, M.Phil, is a Research Scholar in the Department of Economics, Vidyasagar University, West Bengal, India. She has published several articles in reputed journal and contributed chapters in Edited Volumes with renowned publishers like Emerald. Her areas of research interest are in the field of Industrial Productivity.

Mainak Bhattacharjee, M.Phil, is an Assistant Professor in Economics at Loreto College, Kolkata, India. He has been working in the areas of Macroeconomics and International Trade. He has contributed many research articles in reputed journals and chapters in edited volumes with international publications along with having a number of undergraduate level text books to his credit.

Rathindra Nath Biswas, is a renowned disaster management and modelling researcher having a number of international publications in various reputed international journals. He is currently working as a Research Officer in Center for Environmental and Geographic Information Services (CEGIS), Bangladesh. He has a clear knowledge in fluvial and coastal geomorphology, disaster management, environmental modeling and remote sensing.

Cağatay Çağlayan is a 3rd grade Economics & Finance student in Istanbul Medipol University. He is also student of Health Management Department in Istanbul Medipol University. His research interests are sustainable energy economics, renewable energy, and nuclear energy. He has some articles and international book chapters related to these topics.

Mehmet Akif Ceylan, PhD, Professor in Department of Geography of Faculty of Art and Sciences at Marmara University, Turkey. He completed his doctoral program in 1998 at Marmara University, Institute of Social Sciences, Department of Geography Education. He has published a number of research articles in several international journals.

Chandrima Chakraborty, PhD, is an Assistant Professor in the Department of Economics, Vidyasagar University, India. Her major area of academic interest includes Applied Econometrics, Industrial Growth, Productivity and Efficiency, Environmental Economics, Gender Studies, Health as well as Education.

Nilendu Chatterjee, PhD, is an Assistant Professor in Economics, Bankim Sardar College, West Bengal, India. He has research interests in Resource Economics, General Equilibrium and Development Economics. He has published a number of research articles in several international journals of economics including *International Journal of Sustainable Economics Management*, *Economic Affairs*, and *Foreign Trade Review*.

Tonmoy Chatterjee, PhD, is an Assistant Professor in Economics, Ananda Chandra College, West Bengal, India. He has research interests in International Trade Theory, General Equilibrium, Health Economics and Development Economics. He has published a number of research articles in several international journals of economics including *Review of Economics, International Journal of Sustainable Economies Management, Economic Affairs, Foreign Trade Review, The Pakistan Development Review*.

Andrea Ciacci, Ph.D. Student in Management and Security at the University of Genoa (Italy), Department of Economics and Business Studies. He is a Member of Centro de Investigaciones Econometría (C.I.E., Universidad de Buenos Aires, Argentina) and scientific societies such as the Italian Society of Management (SIMA) and Italian Society of Statistics (SIS). His main research interests are focused on business, business and economic crisis, entrepreneurship, social entrepreneurship, strategic management, tourism management, smart city and statistical applications aimed at studying social phenomena.

Akash Dandapat, M.Phil, is pursuing PhD at Vidyasagar University, West Bengal, India. He has deep research interest in unorganised sector and informal labour market. He completed B.Sc. and M.Sc in Economics from Vidyasagar University and was awarded Gold Medal for the same.

Ramesh Chandra Das, PhD, is a Professor of Economics at Vidyasagar University, India. He has more than 20 years of teaching and research experience in different fields of Economics. He has published several articles and books with world's leading publishers.

Dipankar Das, M.Phil, is Research Scholar in Economics at West Bengal State University, India. He has published a number of research articles in different journals. He has already submitted his PhD Thesis.

Pinaki Das, PhD, is a Professor of Economics, Vidyasagar University. He was awarded the Gold Medal for First position in M.Sc. in Economics. He performed the role of Project Director of three Major Research Projects funded by UGC and ICSSR. He has presented his papers in more than 70 national and international Seminars and Conferences and got over 50 research papers published in internationally reputed journals. He has also published six books.

Hasan Dincer, PhD, Professor of Finance at Istanbul Medipol University, Faculty of Economics and Administrative Sciences, Istanbul-Turkey. He is the Executive Editor of the *International Journal of Finance and Banking Studies* (IJFBS) and the Founder Member of the Society for the Study of Business and Finance (SSBF). He has about 200 scientific articles and some of them are indexed in SSCI, SCI-Expended and Scopus. In addition to that, he is also editor of many books published by Springer and IGI Global.

Dipti Ghosh, M.Phil, is currently working as a Junior Research Fellow in Kolaghat Government Polytechnic, West Bengal, India. Her research interests lie in macroeconomics and Indian economy. She has been associated with Bijoy Krishna Girls' College, Howrah, India as a College Contractual Temporary Teacher (CCTT) of Economics along with being visiting faculty at Netaji Subhas Open University, Kolkata, India.

Nandini Ghosh, PhD, an Assistant Professor, Department of Microbiology, Vidyasagar University, India. She is working on allergen identification and development of therapeutic strategies. She has expertise in immunology, proteomics, molecular biology and bioinformatics. She has published many papers in internationally reputed journals, such as *Scientific Reports* (Nature), *PLoS One, BMC Public Health, Heliyon*, etc. She was selected as a Fellow of Indian Aerobiological Society. She has received P.H. Gregory Young Scientist Award, Abstract Award from European Academy of Allergy and Clinical Immunology, etc.

Sanghita Ghosh, M.Phil, is presently associated with Jadavpur University, India, as Junior Research Fellow in Economics. Her research interest lies in the area of Development Economics and Econometrics. Previously, she served at IMI, Kolkata in the capacity of Research Associate. She has published articles in reputed journals.

Md Rakibul Hasan, M.Phil, is a Research Scholar in the Department of Economics, Vidyasagar University, India. He has published several articles in reputed journal and contributed chapters in Edited Volumes with renowned publishers like Emerald, Routledge and P.A.I.O.L.C.K. His areas of research interest are in the field of Industrial Productivity, Health Economics, etc.

Imran Hussain is a Research Scholar in the Department of Economics, Vidyasagar University, India. His area of research is growth of human capital and its growth linkages in countries and states.

Enrico Ivaldi, PhD, is a Research Fellow in Social Statistics at the University of Genoa, Department of Political Science, Italy. He is a member of the editorial board of Revista de Estudios Andaluces (REA); the Scientific Committee of the National Nautical Observatory; CIELI – Italian Centre of Excellence in logistics, transport and infrastructure, etc. and also a member of various scientific societies, including the European Association for Evolutionary Political Economy, the Italian Association of Health Economics, The Royal Statistical Society.

Susobhan Maiti, PhD, is an Assistant Professor in the Department of Economics, School of Humanities and Social Sciences (SHSS), Jain (Deemed-to-be University), Bangalore, India. He has published many research papers in the area of industry, efficiency and productivity in both national and international journals.

Shrabanti Maity, PhD, is an Associate Professor of Economics at Vidyasagar University. Her research interest is diversified. More than 30 of her articles are published in different international and national journals including *BMJ Public Health*, *Development in Practice*, *Journal of Knowledge Economy*, etc. A book entitled *A Study of Measurement of Efficiency* is written by her which is published by Verlag Dr. Muller.

Debashis Mazumdar, PhD, is a Professor of Economics at The Heritage College, Kolkata. India. He is also acting as visiting faculty in the Post Graduate Department of Commerce at Nababullygunge Mahavidyalaya Kolkata and in the PG (Economics) Section of Indira Gandhi National Open University (IGNOU). He has written a good number of text books on Managerial Economics and contributed articles in many national and international journals.

Md. Juel Mia, an Assistant Professor at the Institute of Disaster Management and Vulnerability Studies, University of Dhaka, Bangladesh. Prior to his Unviersity career, he served as a newsroom editor at *Somoy News* (television channel). He is the Founder of Disaster Perception, a volunteer platform that aims to bring awareness to people's responses to disasters. His research interests are disaster communication, disaster governance and spatial analysis.

Pulak Mishra, PhD, is a Professor in the Department of Humanities and Social Sciences, IIT Kharagpur, India. His research interests include problems in the

fields of Industrial Economics, Public Economics and Policy and Economics of Rural Development. He has undertaken many consultancy projects related to public policy, rural development and corporate sector.

Debabrata Mukhopadhyay, PhD, is a Professor in the Department of Economics, West Bengal State University, India. He has 20 years of teaching and research experience and published several articles in scholarly international peer reviewed journals. He has been presently working on green finance and social determinants of health.

Debasish Nandy, PhD, is an Associate Professor, Department of Political Science, Kazi Nazrul University, Asansol, West Bengal, India. He is the Visiting Faculty in the Department of International Relations, Tajik National University, Dushanbe, Tajikistan. He has published a number of research papers in national and international well-reputed journals and edited volumes. His research interests include India's Foreign Policy, South Asian Politics and Security Affairs.

Asish Kumar Pal, PhD, is an Assistant Professor, Department of Economics, Tarakeswar Degree College, West Bengal, India. He has published about 16 research papers in various refereed national and international journals and 5 chapter contributions to edited books. His areas of research interests are Microeconomics, Development Economics, Rural Economics and Environmental Economics.

Mihir Kumar Pal, PhD, is a Professor, Department of Economics, Vidyasagar University, India with more than 25 years of research and teaching experience. He was awarded Gold Medal at both UG and PG level in Economics from the University of Kalyani. He has completed a number of research projects under UGC and published several books, articles in reputed national and international journals. His areas of research interest are Environmental Economics, Industrial Productivity, Capacity Utilisation and Applied Econometrics.

Amartya Pani is a doctoral scholar at Indian Institute of Technology, Kharagpur, West Bengal, India. He has published a number of research articles in different journals. His areas of research interest are Agricultural Geography, Natural Resource Management and Conservation and Sustainability.

Sarbapriya Ray, PhD, is an Associate Professor in Commerce, Vivekananda College and a Visiting Professor in the Department of Commerce, University of Calcutta, India. He has obtained M.Com, MBA, M.Phil & PhD and published 7 books, several articles in reputed national and international journals.

Prasanta Kumar Roy, PhD, is an Associate Professor of Economics, Midnapore College (Autonomous), West Bengal, India. He has more than 20 years of teaching experience with almost 25 articles in various national and international

journals of the repute. He is an editorial board member of the Science Publishing Group, USA.

Swarup Samanta, has completed his Post Graduate Degree in Economics from Vidyasagar University, India. His research interest is on energy and environmental economics.

Atanu Sengupta, PhD, is a Professor, Department of Economics, Burdwan University, West Bengal, India. He has published about 50 papers in various refered national and international journals such as *Economic and Political Weekly*, Sankhya, Social Indicators Research, International Journal of Education and Development, Indian Economic Review, Asia Pacific Development Journal, Asia Pacific Journal of Education and Development and also in various edited volumes. He also published 10 books, edited 4 books in national and international publication houses. His areas of research interests are in Econometrics, Financial Economics, Development Economics, Microeconomics and Growth Theory.

Begum Sertyesilisik, PhD, is a Professor. She has been awarded her BSc, MSc and MBA degrees from the Istanbul Technical University, and her PhD from the Middle East Technical University. She specialises in the field of construction project management. She has many national and international publications in reputed books and journals.

Egemen Sertyesilisik, PhD, at the Marmara University, Turkey in the field of Political Economy of the Middle East. He has a MA in the Politics and the Mass Media from the University of Liverpool. He obtained a MBA at the Yıldız Technical University in 2010. He specialises in the field of political economy, water resources and sustainability.

Daisy Singh is a Research Scholar at Indian Institute of Technology, Kharagpur, West Bengal, India. The scholar has published several articles in different journals.

Madhabendra Sinha, PhD, is an Assistant Professor at the Department of Economics & Politics, Visva-Bharati University, Santiniketan, India. He has a couple of Scopus/WoS/ABDC listed publications from reputed publishers including Elsevier, Springer, Routledge, Sage, Emerald, Inderscience, etc.

Riccardo Soliani, PhD, is an Associate Professor in the History of Economic Thought and Microeconomics at the School of Social Sciences – Department of Political Science, University of Genoa, Italy. He is a member of the board of the PhD School in Political Economy, University of Genova (Italy), where he teaches comparative economic theories and heterodox macroeconomics.

Gülsüm Sena Uluer is a 4th grade Business Administration student in Istanbul Medipol University. She is also student of Business Administration Integrated

Master with Thesis student in Istanbul Medipol University. Her research interests are sustainable energy economics and project finance, electricity, renewable energy, and nuclear energy. She has some articles and international book chapters related to these topics and one of them is indexed in SSCI.

José G. Vargas-Hernández, M.B.A; PhD, Research Professor Postgraduate and Research Division Instituto Tecnológico José Mario Molina Pasquel y Henríquez, Unidad Académica Zapopan, Mexico. Member of the National System of Researchers of Mexico. Professor Vargas-Hernández has a PhD in Public Administration and a PhD in Organisational Economics. He has been visiting scholar at Carleton University Canada, University of California Berkeley and Laurentian University, Canada. Published 9 books and more than 300 papers in international journals and reviews (some translated to English, French, German, Portuguese, Farsi, Chinese, etc.) more than 300 essays in national journals and reviews. He has obtained several international awards and recognitions. He also has experience in consultancy. His main research is in organisational economics and strategic management. He teaches for several doctoral programs.

Serhat Yüksel, PhD, is an Associate Professor of Finance in İstanbul Medipol University. Before this position, he worked as a senior internal auditor for seven years in Finansbank, Istanbul-Turkey and one year in Konya Food and Agriculture University as an Assistant Professor. His research interests lie in energy economics, banking, finance and financial crisis. He has more than 140 scientific articles and some of them are indexed in SSCI, SCI, Scopus and Econlit. Also, he is the editor of some books that will be published by Springer and IGI Global.

Foreword

The increasing impact of environmental emissions on the planet-wide climate change poses one of the most challenging causes of the hardest-hit global warming with asymmetrical consequences on the socio-ecology systems, economic growth among the regions, countries, industrial sectors, and communities. The environmental emission and its consequence the climate change challenge is also a sustainable development challenge that needs to address the issues related considering the asymmetries, dilemmas and paradoxes which must be solved by reaching a consensus of all involved.

Global warming as the cause of climate change is associated with unsustainable production and consumption patterns based on the use of carbon fossil fuels, unsustainable growth of industry and aggregate economic activities, the collapse of the socio-ecological systems, crisis on environmental services and unhealthy quality of life. Some negative effects of emissions are more pollution and deterioration of various natural capital, including non-renewable natural resources such as forest, water, and other environmental services.

This situation is leading towards an economics of climate change with those that have contributed the least to the global warming, given the low levels of greenhouse gas emissions and have the minor contributions to climate change, because their vulnerability to negative impacts, are being the hardest hit. There are specific economies, regions, industry sectors, communities, and socioeconomic groups whose production structures and consumption patterns are releasing a high level of emissions with a large carbon footprint causing damage to the most vulnerable by the adverse impacts of climate change, affecting their economic growth, social cohesion, and environmentally sustainable development.

Sensitive to these arguments, the book offers theoretical and empirical analysis concerning the impact of environmental emissions on various industry sectors and economic activities of emerging economies, South Asian economies, Asiapacific economies, Jordan, and most of all from various industry sectors of India.

Environmental emissions have an impact on climate change that is ushering environmental constraints and challenges, which are an imperative to rework production and consumption patterns. Policy formulation and implementation is required by adapting to the new climate conditions and implement mitigating measures aimed to maintain and improve a more sustainable growth of industry and enhance the aggregated economic activities. The recognition of common responsibilities with differentiated capabilities shapes the transition towards the improvements of economic growth, the enhancement of social justice and

xxii Foreword

inclusiveness, and more ecological sustainable form of development that will preserve the natural resources to leave a legacy to future generations of more socially equal and inclusive, low carbon economic growth.

José G. Vargas-Hernández, M.B.A; PhD. Research Professor Postgraduate and Research Division Instituto Tecnológico José Mario Molina Pasquel y Henríquez, Unidad Académica Zapopan

Acknowledgements

It is a matter of great pleasure to me to complete the proposed book titled, *The Impact of Environmental Emissions and Aggregate Economic Activity on Industry: Theoretical and Empirical Perspectives*, after giving over a long time on the stages from proposal writing to final submission. I have run into large debts to a number of persons in the course of this huge task. It would be blameworthy if I do not recognise the contributions of the concerned academicians and the other members of the society directly or indirectly attached to the project.

At first, I must acknowledge the Emerald Publishing Ltd. Team for approving the proposal and continuously guiding me at all stages of developments of the book. Secondly, I should be grateful to my colleague Dr Ramesh Chandra Das, Professor of Economics, Vidyasagar University, India who left no stone unturned in his constant help and support at every stage of this volume and my PhD supervisor Dr Madhusudan Datta, Professor of Economics, Kalyani University, India, from whom I got the basic conceptual ideas in respect of this field of research. Thirdly, I must express gratitude to Professor José G. Vargas-Hernández, Research Professor at University Center for Economic and Managerial Sciences, University of Guadalajara, Mexico, who took lot of pains in writing the foreword of this book in spite of his busy Schedule, Professor Begum Sertyesilisik, Izmir Democracy University, Turkey, Dr Pulak Mishra, Professor, Department of Humanities and Social Sciences, IIT Kharagpur, India, Dr Nilendu Chatterjee, Assistant Professor in the Department of Economics, Bankim Sardar College, West Bengal, India and all my colleagues in the Department of Economics, Vidyasagar University, India for their constant help and support. Fourthly, I am highly indebted to my Doctoral Research Scholars Md Rakibul Hasan and Pinki Bera who were constantly by my side during the whole project and help me to go through the rough terrain of this work. Fifthly, I should pay gratitude to all the contributing authors for their valuable chapter contributions and showing their patience for such a long length project. I must acknowledge the values they added to the existing literature through this volume.

Last but not the least I must be grateful to my parents, wife and son, brothers and other members of the family for their continuous influence, supports and sacrifice in carrying out the extensive project. Of course, no one other than me, as the editor, discloses to remain entirely responsible for any errors still stay behind the book.