

Linköping Studies in Arts and Sciences No. 938

Readiness, Risk, and Reform: A Dynamic Triad of Sustainability

Mohammad Rakib Uddin Bhuiyan



Linköping Studies in Arts and Sciences No. 938

Readiness, Risk, and Reform: A Dynamic Triad of Sustainability

Mohammad Rakib Uddin Bhuiyan



Department of Management and Engineering, Division of Economics
Faculty of Arts and Sciences
Linköpings universitet, SE-581 83 Linköping, Sweden
Linköping 2026

Supervisor:

Ali Ahmed
Professor
Linköping University

Co-supervisor:


Gazi Salah Uddin
Professor
Linköping University

Anupam Dutta
Associate Professor
University of Vaasa

Faculty opponent:

Andreas Stephan
Professor
Linnaeus University

© Mohammad Rakib Uddin Bhuiyan, 2026

 Except where otherwise noted, this work is licensed under a Creative Commons Attribution 4.0 International license. To view a copy of this license, visit:

<https://creativecommons.org/licenses/by/4.0/>

Printed in Sweden by LiU-tryck, 2026

ISBN 978-91-8118-503-4 (print)

ISBN 978-91-8118-504-1 (PDF)

<https://doi.org/10.3384/9789181185041>

ISSN 0282-9800

Cover image generated using Claude AI (Anthropic) and adapted by the author.

Abstract

Sustainable development depends not only on economic, social, and environmental objectives, but on the systemic capacity of societies to anticipate uncertainty, absorb shocks, and adapt through purposeful reform. This dissertation advances a unifying conceptual framework, the dynamic triad of readiness, risk, and reform, to explain how systemic capacity contributes to sustainable outcomes, how its effectiveness is conditioned by uncertainty, and how it is reshaped through reform across levels of analysis. Readiness denotes the accumulated institutional, technological, financial, and social capacities that enable anticipation and response. Risk captures multidimensional uncertainty and vulnerability that condition their effectiveness. Reform represents structural interventions triggered by revealed weaknesses. Their interaction forms a continuous feedback loop shaping resilience and long-term sustainability outcomes.

Adopting a multi-scalar perspective, the dissertation examines these dynamics at the micro (firm), meso (industry and market), and macro (national) levels across five empirical studies. Using diverse econometric approaches, including survival analysis, regime-switching VAR models, threshold regressions, triple-difference designs, mediation and moderation analysis, and panel Granger causality tests; the research investigates renewable energy innovation, climate finance and clean water investment, firm survival during COVID-19, and post-crisis safety reforms in global value chains.

The findings demonstrate that readiness is multidimensional and context dependent. At the firm level, innovation capabilities

significantly increase survival probabilities during systemic shocks. At the market level, climate policy uncertainty exhibits nonlinear and regime-dependent effects: risk constrains investment under high volatility but enables strategic positioning under stable conditions. At the national level, systemic readiness promotes renewable energy innovation by reducing socio-economic vulnerability and strengthening R&D investment. These effects are strongest among innovation leaders, with R&D serving as the dominant channel in middle-income countries. However, these benefits are regime dependent: overall, economic, and social readiness promote renewable energy innovation under low uncertainty, but their positive influence weakens beyond the uncertainty threshold. In contrast, governance readiness exerts a negative effect that intensifies as uncertainty increases. Bidirectional dynamics between core and enabling technologies confirm their co-evolution within national innovation systems and highlight the risk of widening global innovation disparities if readiness accumulation remains uneven. Crisis-induced reforms can strengthen institutional capacity but may also impose adjustment burdens that reshape market entry and dynamics.

Overall, the dissertation shows that sustainable development hinges on proactive capacity building, strategic risk management, and carefully designed reform processes. By integrating insights from institutional economics, sustainability transitions, and financial instability theory; the study contributes an analytical framework for understanding resilience in an increasingly uncertain world.

Keywords: Innovation, Readiness, Risk, Reform, Export Dynamics

Acknowledgements

After the long road, a moment of calm.

Looking back, I am grateful for this doctoral journey, not only for what it produced academically, but for the people, conversations, and generosity that shaped it along the way. I am also grateful to the University of Dhaka, Bangladesh, for their financial support throughout my doctoral studies, without which this journey would not have been possible.

I owe deep thanks to my supervisor, Ali Ahmed, for giving me the freedom to explore and find my own path, a gesture of trust that proved instrumental in my development as an independent researcher. Over time, I came to deeply appreciate his ability to pinpoint precisely what was missing or flawed in my drafts; his feedback did not merely correct, it clarified and strengthened the work. Our candid conversations on topics both within and beyond economics were among the unexpected pleasures of this process.

This journey also took an unexpected geographical turn. When I first considered pursuing a PhD, Sweden was not on my radar. A fortunate meeting with my co-supervisor, Gazi Salah Uddin, changed that trajectory, and I remain thankful for the conversation and the many subsequent interactions that reshaped this path. Through him, I was introduced to Anupam Dutta, who became both co-author and research host. Anupam has been exceptionally generous and supportive throughout this period, and I am sincerely grateful for his confidence in my work.

I am equally thankful to my examiners at my final seminar. I would like to thank my external examiner, Ugur Soytaş, for his thoughtful and constructive engagement with the thesis, and my internal examiner, Bo Sjö, whose sharp observations brought both clarity and depth to the work. I will also fondly remember the day, Sjö took Baki and me to explore the Swedish countryside, a generous gesture that revealed a lighter and more open side of him.

Beyond formal academic roles, many colleagues contributed to making these years both intellectually stimulating and personally meaningful. I am grateful to Chowdhury Abdullah Al-Baki, a companion and fellow traveller throughout this journey, whose steady presence made the road considerably easier to walk. I also thank Robert Lindahl, Amanda Lindkvist, and Mimmi Gustafsson for the many discussions we shared across courses and conferences. Mimmi, thank you for taking me and my family swimming in a Swedish lake, a memory I will always cherish. I am equally thankful to Axel Hedström and David Stenvall, with whom I often discussed econometric questions and coding. David, in particular, showed rare thoughtfulness in following the progress of my work and sharing papers he believed might sharpen my thinking, a quiet but meaningful form of support.

I also warmly remember the annual Christmas dinners at Göran Hägg's home, my first glimpse into a Swedish household, where he welcomed us with generosity and grace. I remain grateful for his hospitality. I am also grateful to Anki Rune for her warmth and

patience in navigating the many administrative complexities that accompanied my externally funded position.

Finally, my deepest gratitude belongs to my family. To my wife, Liza, whose patience, strength, and quiet confidence sustained me more than she knows; to my children, Rahi, Rumaisa, and Ruzita, who reminded me daily of perspective and joy; to my parents and siblings; and to a few Bangladeshi friends and families in Linköping — Fahim, Nur, and Adnan — whose faith in me never wavered: thank you for making this journey meaningful far beyond its academic outcomes.

Mohammad Rakib Uddin Bhuiyan
Linköping

List of papers

- I. Fatema, F., Bhuiyan, M.R.U., Islam, M.M., & Rahman, R., *Innovation and business survival during Covid-19 pandemic: firm-level evidence from Europe*, *Innovation: The European Journal of Social Science Research* (2025), 1-28. *Reprinted by permission from the publisher.*
- II. Bhuiyan, M.R.U., Dutta, A., Ahmed, A., & Uddin, G.S., *Impact of climate risk on clean water investments: Does crude oil act as a hedge?* *Journal of Open Innovation: Technology, Market, and Complexity* (2026), 12(1), 100708. *Published open access under the CC BY license.*
- III. Bhuiyan, M.R.U., Dutta, A., Uddin, G.S., & Ahmed, A., *Readiness, riskiness and renewables: Country-level readiness and innovation in renewable energy under macroeconomic uncertainty*, *Sustainable Futures* (2025), 10, 101158. *Published open access under the CC BY license.*
- IV. Bhuiyan, Mohammad Rakib Uddin, *Safety Reforms and Export Reallocation: Evidence from the Garment Industry in Bangladesh after the Rana Plaza Disaster*. *In manuscript*
- V. Bhuiyan, Mohammad Rakib Uddin, *Systemic Readiness, Core and Enabling Renewable Energy Innovation: Exploring Mediation, Moderation, and Dynamic Interdependence*. *In manuscript*

Table of Contents

Abstract.....	iii-iv
Acknowledgements.....	v-vii
List of papers.....	ix
Table of Contents.....	xi
Introduction.....	1-2
The Dynamic Triad: Readiness, Risk, and Reform.....	2-3
Research Questions.....	4
Multi-Scalar Analytical Framework.....	5-6
Overview of the Five Papers.....	7-9
Key Insights.....	10-11
Methodological Approaches.....	11-12
Implications for Theory and Policy.....	12-14
Limitations.....	14-15
Looking Forward.....	15-17
References.....	18-19

Introduction

Sustainable development is widely understood as a multidimensional construct, grounded in a broad consensus that it rests upon three interdependent pillars: the economic, the social, and the environmental (Purvis et al., 2019). Advancing these dimensions in an era of accelerating change and deepening uncertainty requires that societies possess the capacity, hereafter referred to as readiness, to anticipate challenges, respond to crises, and adapt through purposeful reform (Termeer et al., 2017). The importance of such readiness has long been recognized. In the late twentieth century, the World Bank and the International Monetary Fund promoted market-based economic reforms as a primary pathway to growth. More recently, insights from structural and institutional economics have emphasized a more balanced approach, one that combines market mechanisms with strategic investment in hard infrastructure, including physical systems and technology, and soft infrastructure, including institutions, human capital, and governance, to support sustainable development (Lin, 2011). The growing relevance of systemic readiness is also reflected in contemporary policy initiatives. For example, the International Renewable Energy Agency launched the Renewables Readiness Assessment program in 2011 to assist countries in scaling up renewable energy deployment.

Yet in a rapidly changing world, fundamental questions remain regarding how societies develop readiness to confront crises and uncertainty that increasingly affect multiple sectors of modern economies (Jin et al., 2025). Crisis and uncertainty have long been

recognized as inherent features of economic decision-making (Keynes, 1937), while modern societies have increasingly sought to conceptualize uncertainty as actionable, governable, and calculable risk (Bonß, 2013). At the same time, crises have been theorized as potential catalysts for systemic transformation toward sustainability (Gunderson et al., 2017; Newig et al., 2019). However, empirical evidence across contexts reveals a persistent pattern of failed or reactive reform initiatives that fall short of generating durable resilience (Rapsikevičius et al., 2022; Rosada & Paksi, 2025).

These defining features of contemporary systems, characterized by pervasive uncertainty and recurrent reforms that challenge sustainability, motivate the present study and underscore the need for a systematic understanding of how readiness, risk and reform jointly shape adaptive capacity and long-term sustainability outcomes.

The Dynamic Triad: Readiness, Risk and Reform

This dissertation advances a unifying conceptual framework centered on what is termed the dynamic triad of readiness, risk and reform. Readiness refers to the accumulated institutional, technological, financial, and social capacity that enables societies, industries, and organizations to anticipate and prepare for challenges. Furthermore, strategic readiness provides a stabilizing framework that can mitigate systemic disruptions, enabling adaptive responses that preserve transformative pathways (Atalay Mazlum, 2022). Risk captures the multifaceted uncertainties and vulnerabilities that test preparedness and expose systemic weaknesses. Reform denotes the

transformative interventions, including policy changes, institutional restructuring, and regulatory innovation, designed to address revealed vulnerabilities and rebuild capacity.

These three forces interact through a continuous feedback loop. Readiness shapes how systems respond to risk; exposure to risk reveals gaps in readiness and generates pressure for reform; and reform, in turn, rebuilds readiness for future challenges. While the specific manifestations of readiness, risk, and reform vary across organizational, industrial, and national contexts, the fundamental dynamics of their interaction remain consistent. Together, they shape the prospects for sustainable development and resilience in an increasingly uncertain world, as illustrated in **Figure 1**.

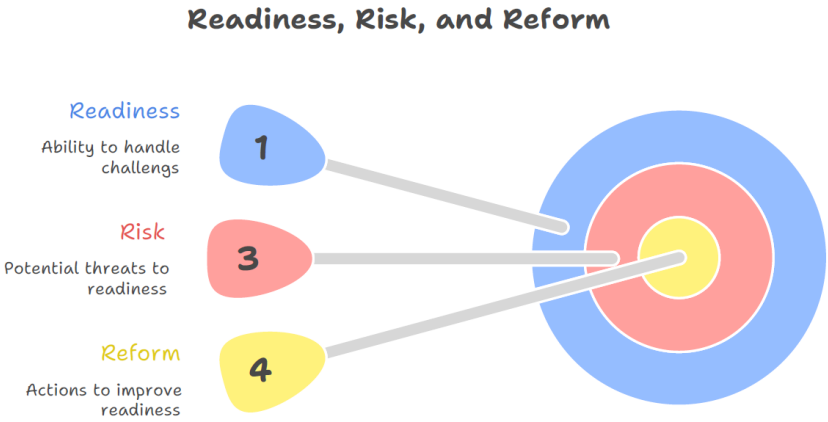


Figure 1: The Dynamic Triad of Readiness, Risk, and Reform.

Research Questions

Guided by this framework, this dissertation address four primary research questions:

RQ1: To what extent does readiness, encompassing economic, social, institutional, and governance dimensions, translate into sustainable outcomes, particularly under conditions of uncertainty, and through which mechanisms does readiness shape resilience across different contexts and levels of analysis? (*Addressed in Papers 3 and 5*).

RQ2: Which dimensions of readiness prove most critical during crises, and how do organizational adaptive capacities influence survival under extreme shocks? (*Addressed in Paper 1*)

RQ3: How does exposure to risk and uncertainty shape investment patterns and market dynamics, and what hedging mechanisms prove effective under climate uncertainty? (*Addressed in Paper 2*)

RQ4: Do crisis-induced reform strengthens readiness and contribute to long-term sustainability, or can they generate unintended forms of fragility and reshape competitive landscapes? (*Addressed in Paper 4*)

Addressing these questions is essential for understanding how economic actors at multiple scales, including nations, industries, and organizations, build and maintain resilience amid persistent uncertainty and competing pressures for sustainable development. This challenge has become not merely an academic concern, but a defining issue of our time.

Empirical Contexts and Sustainable Development Goals

This dissertation examines these dynamics across four critical domains of sustainable development: renewable energy innovation, digital innovation, clean water investment, and socially responsible value chains. Collectively, these domains address five United Nations Sustainable Development Goals (SDGs): SDG 6 (Clean Water and Sanitation), through analysis of clean water investment under climate risk; SDG 7 (Affordable and Clean Energy), by examining how readiness shapes renewable energy innovation; SDG 9 (Industry, Innovation and Infrastructure), through investigation of innovation capacity and firm resilience; SDG 12 (Responsible Consumption and Production), by analysing how reforms reshape supply chains toward corporate social responsibility; and SDG 13 (Climate Action), by exploring adaptation readiness under uncertainty. Across these contexts, the dissertation demonstrates that achieving sustainable development depends on building readiness, managing risks, and implementing reform that strengthens adaptive capacity at multiple scales.

Multi-Scalar Analytical Framework

The dynamics through which readiness, risk, and reform interact to shape sustainable outcomes vary significantly across levels of analysis. Accordingly, this dissertation adopts a multi-scalar perspective, as illustrated in **Figure 2**. At the micro level, firm-level analysis examines how organizational readiness, reflected in innovation capabilities, financial resources, and adaptive management

practices, mediates survival and performance under sudden and extreme shocks, such as the COVID-19 pandemic. At the meso level, markets and industries illustrate how exposure to risk and the implementation of reform reshape investment patterns, trade structures and competitive dynamics. At the macro level, the analysis examines how national-level readiness interacts with macroeconomic uncertainty and how that readiness translates into renewable energy innovation outcomes through mediation and moderation mechanisms. This multi scalar perspective enables the analysis to capture both localized adaptive responses and broader structural transformations.

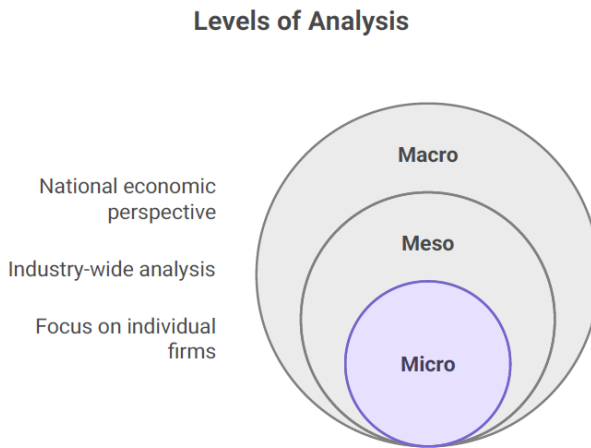


Figure 2: Multi Scalar Framework: Readiness, Riskiness and Reforms Across Levels of Analysis.

Overview of the Five Papers

The five papers comprising this dissertation examine these dynamics across diverse empirical contexts, each illuminating different facets of the readiness, riskiness, and reforms nexus.

Paper 1 (Innovation and Business Survival During COVID-19 Pandemic: Firm-level Evidence from Europe) examines the impact of innovation on firm survival during the COVID-19 crisis. The paper analyses how innovation capabilities, a key dimension of organizational readiness, influence survival outcomes across European firms, demonstrating that adaptive capacity proved decisive in navigating profound uncertainty. The study shows that multiple forms of innovation, including product, distribution, marketing, and organizational innovations, significantly increase the probability of business survival during the pandemic. Moreover, although the magnitude of the effects varies slightly, the positive impact of innovation on survival remains robust across firms of different sizes and across industries. Overall, the findings offer important managerial and policy implications regarding the role of innovation in enhancing firm resilience during systemic crises.

Paper 2 (Impact of Climate Risk on Clean Water Investments: Does Crude Oil Act as a Hedge?) explores the interaction between climate policy uncertainty and investment decisions in clean water exchange traded funds. Under conditions of low market volatility, climate policy uncertainty is associated with higher returns, suggesting that climate-policy developments can signal investment opportunities in relatively stable markets. However, as market volatility increases,

climate policy uncertainty exerts a negative effect, consistent with higher discount rates applied to long-term water-infrastructure cash flows. The study further investigates whether traditional commodity assets provide effective risk mitigation under climate uncertainty. The findings indicate that crude oil offers a relatively cost-effective hedge for clean water investment portfolios, whereas technology exchange-traded funds exhibit substantially weaker hedging performance. Overall, the results underscore the importance of regime-sensitive portfolio strategies for investors and suggest that policymakers should consider prevailing market conditions when communicating climate related initiatives. The study also demonstrates that nonlinear modeling approaches are essential for uncovering climate finance linkages that linear methods fail to detect.

Paper 3 (Readiness, Riskiness and Renewables: Country-level Readiness and Innovation in Renewable Energy Under Macroeconomic Uncertainty) directly engages with the dissertation's theoretical framework by examining how national level readiness interacts with macroeconomic uncertainty to shape renewable energy innovation. This cross-country analysis shows that overall country level readiness, and its key components, particularly economic and social readiness, significantly promotes renewable energy innovation under conditions of low uncertainty. However, this positive effect weakens once uncertainty exceeds a critical threshold. In contrast, governance readiness is associated with a negative effect on renewable energy innovation under low uncertainty, with this adverse influence becoming more significant as uncertainty intensifies. Moreover,

lagged macroeconomic uncertainty exhibits a significant negative association with renewable energy innovation. These findings suggest that policymakers and investors should prioritize strengthening country level readiness to mitigate the potentially adverse effects of increased uncertainty on renewable energy innovation.

Paper 4 (Safety Reforms and Export Reallocation: Evidence from the Garment Industry in Bangladesh after the Rana Plaza Disaster) examines how catastrophic risk events trigger regulatory reforms and reshape industry dynamics. The 2013 Rana Plaza collapse, which killed over 1,100 garment workers, exposed critical vulnerabilities in Bangladesh's industrial safety infrastructure. This paper analyses how subsequent safety reforms influenced export market participation, firm survival, and export market restructuring, illustrating how crisis driven reforms can fundamentally alter competitive landscapes while building institutional capacity for worker protection.

Paper 5 (Systemic Adaptation Readiness, Core and Enabling Renewable Energy Innovation: Exploring Mediation, Moderation and Dynamic Interdependence) investigates how systemic readiness, encompassing economic, governance, and social, shapes renewable energy innovation outcomes. By examining both core technologies and enabling innovations, this study reveals the pathways through which readiness translates into core and enabling energy innovations. The analysis demonstrates that readiness operates not merely as a precondition but as an active mediating mechanism for green energy innovation. This mediating role is contingent on national context, moderated by country income level, revealing a context-sensitive

innovation pathway. Furthermore, the dynamic inter causality between core and enabling innovation points to a complex, evolving innovation system.

Key Insights

Several key insights emerge from this body of work. First, systemic readiness is not a binary condition but a continuous, multidimensional construct spanning economic, social, and governance domains. Consistent with the absorptive capacity literature (Cohen & Levinthal, 1990; Varsakelis, 2006), the dissertation demonstrates that readiness constitutes a critical antecedent to innovation, even and especially, under conditions of acute uncertainty. The findings further indicate that the channels through which readiness translates into sustainable outcomes are inherently context dependent, varying with market conditions, governance structures, and social environments.

Second, the dissertation highlights the conditional nature of risk and provides empirical support for Minsky's financial instability hypothesis (Minsky, 1992). Through regime switching analysis, the research shows that the effects of risk are not uniform across states of the economy. Shocks that stimulate innovation and investment under stable market conditions can instead generate contraction and disinvestment during periods of financial stress. Third, the findings corroborate the dual nature of crises. While risks threaten existing capacities and structures, they also disrupt institutional inertia and create windows of opportunity for sustainability through innovation.

This result, supported by the literature on sustainability transitions (Montes et al., 2024), underscores that crises are not only periods of vulnerability but also moments with significant transformative potential. However, realizing this potential depends critically on the design and implementation of reform processes.

Fourth, the dissertation shows that significant adjustment burdens arising from rapid safety reforms can jeopardize the growth potential of economically and socially important industries in resource constrained manufacturing environments. Thus, a deeper understanding of how reforms are initiated, governed, and sustained is essential for deriving robust strategic and policy lessons for navigating an increasingly uncertain future.

Methodological Approaches

The methodological approaches employed across these studies reflect the complexity of the phenomena under investigation. In the first paper, this dissertation uses the univariate Kaplan–Meier survival function to graphically depict whether firms' survival probabilities vary with and without innovation. Cox proportional hazards models are also employed to assess the impact of innovation on firm survival. In the second paper, the analysis begins with a standard vector autoregressive (VAR) model, accompanied by a Markov regime-switching VAR (MRS-VAR) model, to identify the relationship between climate policy uncertainty and clean water investment. The study also computes hedge ratios using the DCC-GARCH model to identify effective hedging instruments for water portfolios. In the third

paper, this dissertation uses a panel fixed-effects threshold regression to reveal a nonlinear relationship in the triadic association among renewable energy innovation, readiness, and uncertainty, using bootstrap methods to identify threshold effects.

In the fourth paper, this dissertation uses firm-level data from the Bangladesh Bureau of Statistics. A contemporary triple difference-in-differences approach, following (Bossavie et al., (2023), is employed to isolate the effect of safety reforms on the garment export market dynamics of Bangladesh. Furthermore, the study uses the World Bank's YKLM gross-output specification to calculate firm-level productivity. In the fifth paper, this dissertation utilizes advanced econometric techniques, both linear and nonlinear, including mediation and moderation analysis and panel Granger causality tests. These methods enable rigorous inference while accounting for endogeneity concerns, temporal dynamics, and cross-sectional heterogeneity. The linear methods establish the relationship between systemic readiness and core and enabling renewable energy innovation, whereas the nonlinear method, panel simultaneous quantile regressions, measures the relationship between the variables when the dependent variable lies within a specific quantile.

Implications for Theory and Policy

This dissertation holds important implications for theory, and policy. Theoretically, it advances understanding of how systemic readiness influences renewable energy innovation under conditions of uncertainty. The findings also demonstrate that the effects of

uncertainty on green innovation and investment are inherently nonlinear and regime dependent. Moreover, the body of works show that private governance mechanisms in transnational value chains may fail to improve business performance and productivity in the short to medium term in a resource constrained environment.

For policymakers, the findings underscore the importance of proactive capacity building, with specific mechanisms identified through which systemic readiness translates into renewable energy innovation outcomes in both high-income and middle-income countries. The results further highlight the need for policymakers to consider market conditions and the timing of policy communication when designing climate interventions. The dissertation also shows that climate action requires specialized forms of governance, and that existing governance mechanisms may generate counterproductive effects on climate outcomes under conditions of increased uncertainty. In the case of implementing private transnational control governance mechanisms, especially in developing country contexts, policymakers should avoid fully imposing all conditions on producers at the outset. Instead, collective mechanisms through which buyers, suppliers, and policy stakeholders jointly contribute can help vulnerable industries manage risk and integrate more effectively into socially responsible global value chains.

For business leaders and organizational managers, the research demonstrates that investment in adaptive capabilities, particularly innovation in various forms, including product, marketing and sales, distribution and logistics, as well as administrative and managerial

innovation, significantly increases the likelihood that firms will survive severe exogenous shocks such as the COVID-19 pandemic. The COVID-19 analysis further illustrates that innovation capacity, which is often viewed primarily through the lens of competitive advantage, also functions as a critical survival mechanism during periods of existential crisis.

Methodological Boundaries and Limitations

The dissertation, while providing robust empirical contributions, operates within defined methodological boundaries. Paper 1 employs a static survival framework to establish the average protective effect of innovation on firm survival; it does not model the dynamic feedback or sequencing of innovations over time, a deliberate scope limitation that opens a clear path for future research. Paper 2 utilizes a Markov Regime-Switching VAR to capture the nonlinear, state-dependent relationship between climate policy uncertainty and water investment returns. However, the results illustrate predictive dynamics rather than structural causality, and the identified regimes remain contingent on specification choices guided by standard statistical criteria. Paper 3 applies a static panel fixed effects threshold regression, which robustly identifies nonlinear threshold effects. Its static nature, however, means it cannot account for potential endogeneity from feedback between past innovation and current readiness, nor can it distinguish between short-run and long-run effects, a distinction crucial for understanding adjustment speeds. Paper 4 employs a triple difference-in-differences design to identify causal effects. While rigorous, the causal

identification is constrained by the relatively short panel and the lack of high-frequency pre-treatment data, which limits the ability to fully test the parallel trends assumption and to observe long-run equilibrium outcomes. Finally, Paper 5 analyses the association between systemic readiness and core and enabling renewable energy innovation, including mediation and moderation effects. The analysis is panel in nature and focuses on comparative patterns across countries. While the results are robust, they cannot be interpreted as causal.

Looking Forward

Looking forward, the readiness, risk, and reform framework offers a valuable lens for addressing emerging challenges toward sustainability. Understanding these dynamics becomes increasingly vital as the pace of change accelerates and the magnitude of potential disruptions grows. Future research will extend the readiness construct to the micro (firm) and meso (industry) levels, examining how ready firms and industries can withstand the pressures of this inherently uncertain world. By operationalizing readiness at these finer-grained levels of analysis, subsequent studies can reveal the organizational capabilities, managerial practices, and industry structures that enable sustained adaptation and competitive survival amid persistent volatility. This extension will complement the macro-level readiness analyses presented in this dissertation and provide actionable insights for managers and industry stakeholders navigating uncertain environments.

The process of producing this dissertation yielded substantial scholarly and empirical learning and strengthened the conviction that rigorous empirical research, grounded in sound theory and executed with methodological care, can illuminate pathways toward more resilient and adaptive societies. As the five papers that follow demonstrate, readiness, risk, and reform are not isolated forces but interconnected processes through which societies, industries, and organizations confront uncertainty, learn from adversity, and evolve through purposeful change. The results presented in this dissertation contribute to advancing knowledge on systemic readiness, riskiness, and reforms in the pursuit of sustainable development.

During the journey as a doctoral student, there have been opportunities to be involved in several other related research projects not included in this dissertation. These additional contributions include the following book chapters:

1. Dutta, A., Bhuiyan, M. R. U., Ahmed, A. & Uddin, G. S. (2023). Climate risk and sustainable investing: New evidence from Chinese renewable energy firms. In H. Phoumin, F. Taghizadeh-Hesary & F. Kimura, (Eds.), *Green Finance and Renewable Energy in ASEAN and East Asia* (pp. 57-79). Routledge-ERIA Studies in Development Economics. Routledge. <https://doi.org/10.4324/9781003397670-4>
2. Dutta, A., Bhuiyan, M. R. U., Wang, G.-J., Uddin, G. S. & Ahmed, A. (2024). Carbon pricing and CCUS: Evidence from China. In H. Phoumin & R. Nepal (Eds.), *Energy transition and carbon neutrality in ASEAN: Developing carbon capture,*

utilization and storage technologies (pp. 203-224). World Scientific. https://doi.org/10.1142/9789811288050_0008

3. Dutta, A. Bhuiyan, M.R.U., Park, D., Ahmed, A. & Uddin, G.S. Do uncertainties impact global renewable energy investments? Accepted for publication in the book series Sustainable Economy & Ecotechnology. Springer.

References

- Atalay Mazlum, A. (2022). Strategic Readiness as One of the Ways to Cope With Uncertainty during the Pandemic of COVID 19 / Pandemi Döneminde Belirsizlikle Başa Çıkma Yollarından Biri Olarak Stratejik Hazırbulunmuşluk. *E-International Journal of Educational Research*. <https://doi.org/10.19160/e-ijer.1092163>
- Bonß, W. (2013). Risk. Dealing with Uncertainty in Modern Times. *Social Change Review*, 11(1), 7–36. <https://doi.org/10.2478/scr-2013-0002>
- Bossavie, L., Cho, Y., & Heath, R. (2023). The effects of international scrutiny on manufacturing workers: Evidence from the Rana Plaza collapse in Bangladesh. *Journal of Development Economics*, 163, 103107. <https://doi.org/10.1016/j.jdeveco.2023.103107>
- Cohen, W., & Levinthal, D. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Gunderson, L., Cosens, B. A., Chaffin, B. C., Arnold, C. A. (Tom), Fremier, A. K., Garmestani, A. S., Craig, R. K., Gosnell, H., Birge, H. E., Allen, C. R., Benson, M. H., Morrison, R. R., Stone, M. C., Hamm, J. A., Nemecek, K., Schlager, E., & Llewellyn, D. (2017). Regime shifts and panarchies in regional scale social-ecological water systems. *Ecology and Society*, 22(1), art31. <https://doi.org/10.5751/ES-08879-220131>
- Jin, Y., Shivers, B. N., Wang, Y., Coombs, W. T., & van der Meer, T. G. L. A. (2025). READINESS as a new framework for crisis management: academic-industry integrated expert insights from practitioners and scholars. *Journal of Communication Management*, 29(1), 1–16. <https://doi.org/10.1108/JCOM-02-2024-0034>
- Keynes, J. M. (1937). The General Theory of Employment. *The Quarterly Journal of Economics*, 51(2), 209. <https://doi.org/10.2307/1882087>
- Lin, J. Y. (2011). New Structural Economics: A Framework for Rethinking Development. *The World Bank Research Observer*, 26(2), 193–221. <https://doi.org/10.1093/wbro/lkr007>

- Minsky, H. (1992). *The Financial Instability Hypothesis* (Working Paper No.74). The Jerome Levy Economics Institute of Bard College, New York.
- Montes, J., Gómez-Cruz, N. A., Batz, A., Serrano Cárdenas, L. F., & Mora Holguín, H. (2024). From crisis to opportunity through innovation. *Management Research Review*, 47(9), 1441–1466. <https://doi.org/10.1108/MRR-05-2023-0324>
- Newig, J., Derwort, P., & Jager, N. W. (2019). Sustainability through institutional failure and decline? Archetypes of productive pathways. *Ecology and Society*, 24(1), art18. <https://doi.org/10.5751/ES-10700-240118>
- Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science*, 14(3), 681–695. <https://doi.org/10.1007/s11625-018-0627-5>
- Rapsikevičius, J., Bruneckienė, J., Krušinskas, R., & Lukauskas, M. (2022). The Impact of Structural Reforms on Sustainable Development Performance: Evidence from European Union Countries. *Sustainability*, 14(19), 12583. <https://doi.org/10.3390/su141912583>
- Rosada, F., & Paksi, A. (2025). Reforming Environmental Governance in Response to Indonesia's Nickel Industrial Policy: A Critical Assessment of Sustainability Challenges. *Global Jurnal Politik Internasional*, 27(1). <https://doi.org/10.7454/global.v27i1.1377>
- Termeer, C. J. A. M., Dewulf, A., & Biesbroek, G. R. (2017). Transformational change: governance interventions for climate change adaptation from a continuous change perspective. *Journal of Environmental Planning and Management*, 60(4), 558–576. <https://doi.org/10.1080/09640568.2016.1168288>
- Varsakelis, N. C. (2006). Education, political institutions and innovative activity: A cross-country empirical investigation. *Research Policy*, 35(7), 1083–1090. <https://doi.org/10.1016/j.respol.2006.06.002>

Papers

The papers associated with this thesis have been removed for copyright reasons. For more details about these see:

<https://doi.org/10.3384/9789181185041>

FACULTY OF ARTS AND SCIENCES

Linköping Studies in Arts and Sciences No. 938, 2026

Department of Management and Engineering
Division of Economics
Linköping University
SE-581 83 Linköping, Sweden

www.liu.se