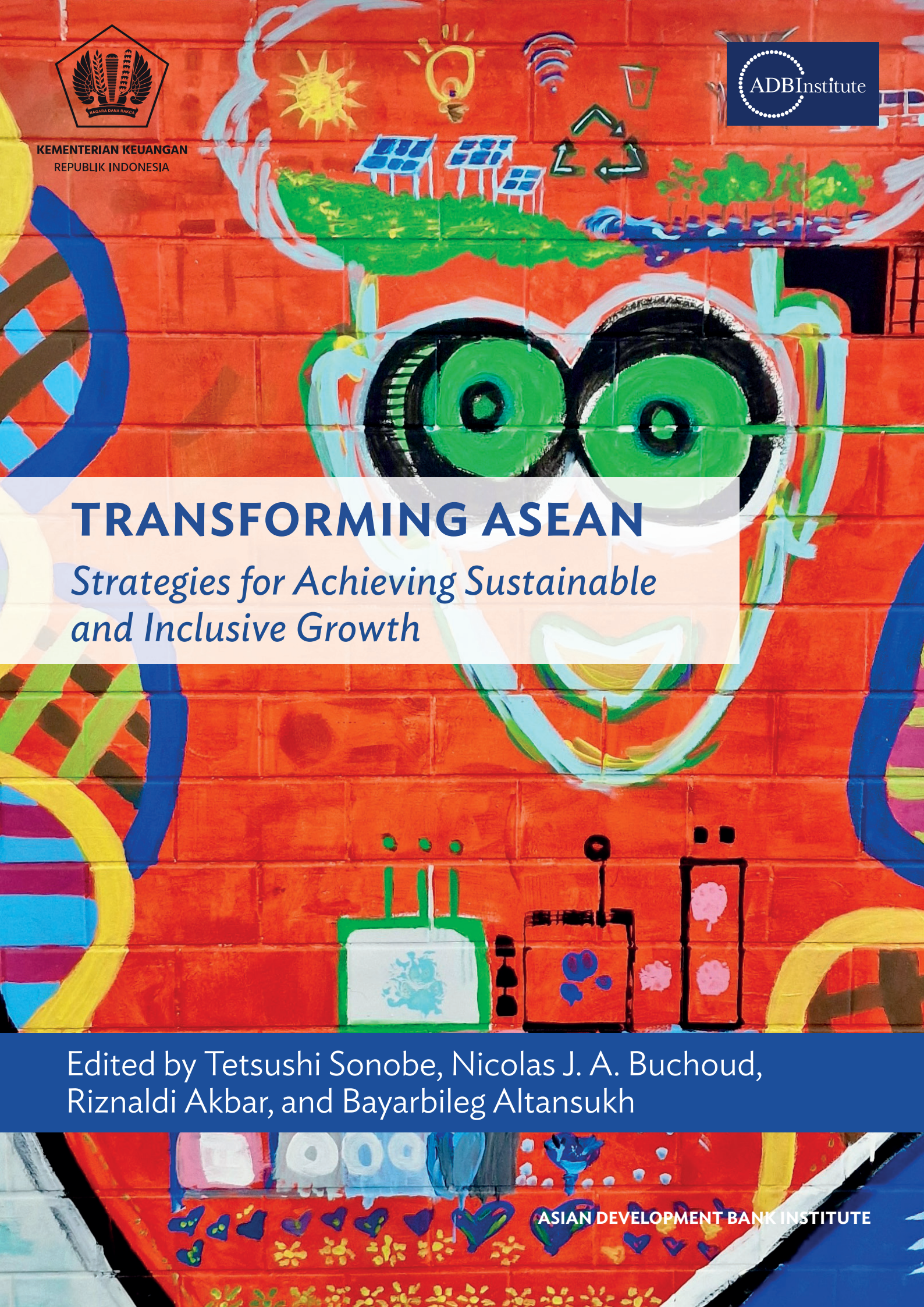

KEMENTERIAN KEUANGAN
REPUBLIK INDONESIA
ADBInstitute
TRANSFORMING ASEAN
Strategies for Achieving Sustainable and Inclusive Growth
Edited by Tetsushi Sonobe, Nicolas J. A. Buchoud, Riznaldi Akbar, and Bayarbileg Altansukh
ASIAN DEVELOPMENT BANK INSTITUTE

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Transforming ASEAN:
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Edited by
Tetsushi Sonobe, Nicolas J. A. Buchoud,
Riznaldi Akbar, and Bayarbileg Altansukh

ASIAN DEVELOPMENT BANK INSTITUTE

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ISBN 978-4-89974-297-5 (Print)
ISBN 978-4-89974-298-2 (PDF)
DOI: https://doi.org/10.56506/FYUK6909

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NOTE ON COVER ARTWORK

"Alone we can do so little; together we can do so much." – Helen Keller

This quote underscores the significance and power of unity in addressing complex challenges, paving the way for humanity to achieve a sustainable future of growth.

The cover artwork shows part of a community mural named "Kaleidoscope of Dreams", painted in 2023 and located at the Coleman Underpass, Singapore. The mural was initiated by Singapore River One, in commemoration of 10 years of placemaking efforts along the Singapore River. The artwork was co-created by Master Artist Sun Yu-li and Artbeatz artists: CJ Kho, Dawn Tam, and Eunice Tan, with the community and their extended family members five lovely dogs.

The photo of the artwork was taken by Nicolas J. A. Buchoud and is printed with permission from, and thanks to, the artists.

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PREFACE

As the 2023 Association of Southeast Asian Nations (ASEAN) Chair, Indonesia has highlighted economic recovery and rebuilding, the digital economy, and sustainability as its key priorities. ASEAN's ability to achieve sustainable growth hinges on how effectively these priorities are implemented. ADBI seeks to contribute knowledge and policy recommendations to support ASEAN's economic transformation during Indonesia's Chairmanship.

This book aims to provide insights and forward-looking ideas through the exchange of ideas and experiences drawn from various sources within ASEAN and beyond. The chapters delve into crucial topics, such as fostering economic resilience and sustainable growth, food security, and bolstering regional and international collaboration. The perspectives and recommendations of government officials, think tanks, and international organizations are harnessed to achieve comprehensive and workable policy solutions.

ADBI believes knowledge-driven discussions and policy recommendations during Indonesia's ASEAN Chairmanship can help chart a course for the region's economic transformation. We seek to facilitate policy dialogues among ASEAN member countries, share knowledge and expertise through our network of think tanks, and identify new financing opportunities that support sustainable growth. Through this book, we aim to contribute objective analyses and forward-looking ideas for consideration by ASEAN policy makers.

We hope the chapters in this collection will generate collaborative thinking on how best to achieve ASEAN's priorities. The recommendations aim to maximize the benefits of ASEAN's economic dynamism while ensuring social and environmental sustainability. Policy coordination and knowledge sharing among countries will be critical to ensure an inclusive recovery that leaves no one behind.

ADBI remains committed to supporting ASEAN's sustainable development through knowledge solutions tailored for the region. We envision this book as a starting point for continuous dialogue, analysis and collaboration that helps ASEAN navigate the path to greater prosperity. We wish the discussions and recommendations here will inspire meaningful policy actions during Indonesia's Chairmanship and beyond.

Tetsushi Sonobe
Dean and CEO
Asian Development Bank Institute

FOREWORD 1

The Association of Southeast Asian Nations (ASEAN) has emerged as one of the fastest-growing regions, maintaining sound macroeconomic conditions and relatively low inflation amid global challenges—expanding by over 4% in 2023 and nearing 5% in 2024 (AREO, October 2023). As a founding member of ASEAN and the largest economy in the region, Indonesia plays a key role in shaping the ASEAN landscape. After successfully hosting the G20 presidency in 2022, Indonesia took global leadership as chair of ASEAN in 2023 under the theme of "ASEAN Matters: Epicentrum of Growth".

Several achievements were delivered under Indonesia's leadership in 2023 in the areas of energy transition, healthcare, infrastructure, food security, and financial stability. Highlighting the commitment to a just, credible, affordable, and orderly energy transition, ASEAN developed the ASEAN Taxonomy for Sustainable Finance – Version 2. ASEAN members also reached an agreement to reposition the ASEAN Infrastructure Fund as an ASEAN green fund to attract more global green investment to the region.

To maintain ASEAN's trajectory as the epicenter of growth, the ASEAN finance process supports and collaborates with other sectoral bodies within the ASEAN framework. On health, ASEAN Finance and Health Ministers met for the first time to discuss the financing gaps in ASEAN for pandemic prevention, preparedness, and response and their solutions. ASEAN finance and agricultural sectors will work hand in hand to formulate strategies and policies for preventing food crises and insecurity in the short and long term. In fact, Indonesia has proposed creating new working groups on health and food security, in addition to existing disaster-risk financing and insurance cross-sectoral coordination.

This book, *Transforming ASEAN: Strategies for Achieving Inclusive and Sustainable Growth*, captures the complexities and nuances of the ASEAN now, as an economic community, and toward 2045—a future defined by a thriving and inclusive low-carbon and digital economy, a stable food security system, cross-border collaboration, and enhanced scientific and higher education capabilities, in support of a strong commitment to global relevance and multilateral cooperation. One of the crucial challenges is the pressing need for a comprehensive energy transition mechanism and sustainable finance. The next chapters of the ASEAN story will be shaped by the integration of sustainable finance mechanisms. Furthermore, cross-border and regional cooperation also poses a tough challenge as interconnection becomes a necessity for the ASEAN nations, particularly in the digital economy era.

Another challenge is the pursuit of a sustainable food security system in the region. Indonesia's leadership has been pivotal in starting discussions on this critical issue. Simultaneously, ASEAN needs to play a vital role in the current global economic system. The challenges outlined herein are discussion points that are followed by policy recommendations for our collective journey toward an ASEAN that is resilient, prosperous, and harmoniously interconnected on the global stage.

We would like to express our gratitude for the continued support and collaboration between the Ministry of Finance of Indonesia and the Asian Development Bank Institute on the production of this book. We would also like to convey our appreciation to the contributors for sharing their insightful thoughts. We hope this book enriches reference and public discussions, especially on the topics of the main agenda of Indonesia's 2023 ASEAN chairmanship. We look forward to continuing discussions on ASEAN's priorities as an epicenter of growth.

Febrio N. Kacaribu
Chairman
Fiscal Policy Agency, Ministry of Finance of the Republic of Indonesia

FOREWORD 2

The year 2023 has again been a momentous year for Indonesia. Indonesia reaffirmed its significance in the global community this year by assuming the Association of Southeast Asian Nations (ASEAN) Chair, after its successful Presidency of the Group of Twenty (G20) in 2022. Highlighting the region as an "epicenter of growth," Indonesia supported work to promote sustainable growth and development in the region while securing food security, managing energy transition, and strengthening cross-border connectivity and regional cooperation.

These priorities are particularly critical as ASEAN continues to face many challenges 3 years after the global pandemic. Following the region's 5.6% growth in 2022, growth is now expected to slow to 4.6% this year and 4.8% next year. This is slightly below ASEAN's long-term average growth, with the region facing many global headwinds, as described by Adam Tooze as a "polycrisis." Inflation has jumped due to supply chain disruptions resulting from the pandemic and policy responses to the pandemic, as well as higher food and fuel prices resulting from the Russian invasion of Ukraine. Geopolitical tensions have risen, financial volatility has increased—and climate change looms ever larger.

To surmount the "polycrisis," the global community will need to adopt well-calibrated and well-harmonized policies. Under Indonesia's 2022 chairmanship, the G20 Summit in Bali made several commitments toward this end: staying agile and flexible in macroeconomic policy, protecting macroeconomic and financial stability, promoting food and energy security, unlocking further investments to help developing countries achieve the Sustainable Development Goals (SDGs), and recommitting to accelerate the achievement of the SDGs.

Thus, this book is extremely useful as it examines some of these critical themes, focusing on ASEAN's low-carbon transition, the food security agenda, and the role of the G20 and ASEAN to in supporting ASEAN in the global economy. This publication is practical as it distills both regional and country-level knowledge and experience, facilitates the sharing of lessons and best practices, and helps policy makers design better policies, solutions, and recommendations for the region.

Going forward, medium-term risks and uncertainties remain but the prospects are also encouraging. It is my hope that this book will help policy makers prepare effective strategies to build on recent economic gains, transform the growth prospects, and help build a more inclusive and sustainable growth path for ASEAN. As we actively engage with stakeholders across Indonesia to identify areas where knowledge and partnerships can foster progress, this publication will also inform the Asian Development Bank's operations and strategy in Indonesia.

I thank the Asian Development Bank Institute and all stakeholders and contributors who helped make this publication possible.

Jiro Tominaga
Country Director
Indonesia Resident Mission
Asian Development Bank

INTRODUCTION

Intensifying Integration, Enhancing Connectivity—ASEAN Is Shaping Its Global Future

Riznaldi Akbar, Bayarbileg Altansukh, and Nicolas J. A. Buchoud

Despite criticism of ASEAN for its ineffectiveness in following up on its initiatives, various countries seek cooperation with ASEAN, and it is also involved in multilateral forums, as in the case of the G20

Riatu Mariatul Qibthiyyah and Faradina Alifia Maizar

Transforming ASEAN: Strategies for Achieving Inclusive and Sustainable Growth was initiated in 2023 with the Ministry of Finance of Indonesia as part of its 2023 chairmanship of the Association of Southeast Asian Nations (ASEAN). Following the motto of the G20 presidency of Indonesia the year before in 2022, "Recover Together, Recover Stronger", the ASEAN 2023 "Epicentrum of Growth" theme marked a strong will to build on the G20 momentum to strengthen Southeast Asian integration and development. The book, therefore, portrays some of the key challenges of a region that has become critical for global growth and sustainability.

In a context of diverse global crises and in a world that has become more uncertain and perilous, starting with global warming, multiple transformations are at play. These transformations are not all negative, as illustrated by the evolution of the role of multilateral development banks (MDBs) to "address the shared global challenges of the 21st century" (IEG 2023a; 2023b). In any case, navigating the post COVID-19 pandemic means developing new abilities to drive and manage complex systems, while strengthening social capital and (re)building trusted links between science and policy, and people are other priorities.

With a population of nearly 700 million people with more than 65% under 35 and a gross domestic product expected to possibly overtake that of Japan by 2030 after increasing nearly 150-fold since 1967 (JICA 2023), ASEAN has gradually affirmed itself as a distinct and integrated socioeconomic space, which also entails a growing geopolitical significance.

Following the creation of the ASEAN Economic Community (AEC) in 2015 and the adoption of its Vision 2025, ASEAN adopted its new Vision 2045 a year after the Covid Comprehensive Recovery Framework was adopted at the ASEAN 37th Summit in Ha Noi in 2021. A strategic plan responding to "evolving global trends and internal challenges", the Vision 2045 extends well beyond the ASEAN Community Vision 2025 as it aims to "intensify integration and enhance connectivity' across economic and socio-cultural sectors" (UNU-MERIT 2023). The new Vision also confronts key issues, such as digital transformation, environmental sustainability, and socioeconomic inequities, setting out a framework for the region's evolution into a globally influential, interconnected, and prosperous region by 2045, and which the present book has also tried to explore (UNU-MERIT 2023).

In 2023, the Ministry of Finance of Indonesia called upon the Asian Development Bank Institute (ADBI) to reflect on the critical ongoing transformations of ASEAN, and we immediately thought about the critical diplomatic week that took place back in November 2022.

At that time, against all odds and contrary to the expectations of many, the G20 Presidency of Indonesia successfully managed to issue a common declaration, whereas the outbreak of the war in Ukraine

earlier in the year had cast doubts about the very ability of an emerging country to lead the world's premier macroeconomic forum. Yet, the G20 success may only have been possible because the G20 leaders' summit took place amid a series of other major fora, starting with the ASEAN Summit in Cambodia and concluding with the PECC summit in Thailand. That Phnom Penh, Bali, and Bangkok hosted summits is a good example of the region's hosting capabilities, but there is more to it. Within a week, all regional and global leaders, including those from the People's Republic of China (PRC), India, the United States, Europe, and Africa, notwithstanding the Russian Federation, gathered within the ASEAN space. The complementarity between the ASEAN, G20, and PECC summits created a positive momentum that illustrated Indonesia and ASEAN's capability to host successfully several high-level diplomatic gatherings in a row. There could hardly have been a better example of the recognition of the region's significance on a global stage.

The articulation of global and regional perspectives in the G20 is not completely new, but it certainly reached a new level in the ASEAN context in 2022 and 2023. In 2023, the combined presidencies of the G7 by Japan and of the G20 by India were instrumental to secure the legacy of the G20 Indonesia and highlight the role of ASEAN. Japan and ASEAN celebrated the 50th anniversary of their mutual friendship and cooperation. As the ASEAN-India dialogue initiated in the early 1990s turned into a more enduring, multi-sectorial partnership and joint action plan, the ASEAN chair was also invited to the G20 Summit, alongside the African Union. The prime minister of India also made a notable appearance at the ASEAN leaders' summit in September 2023 in Jakarta.

As a result, when exchanging with think tanks in the context of G20 Brazil in 2024 and on the way to the G20 South Africa in 2025, the ASEAN socioeconomic and political space seems to matter more. It is not just a major global trade and industrial powerhouse. It is one that matters even more as it managed to develop amid Western, Global South, Indo-Pacific, and Chinese influences. In addition to Japan and India, ASEAN's partnership with the PRC has also expanded significantly since the early 1990s as a designated ASEAN-China Comprehensive Strategic Partnership was established in 2021. Meanwhile, ASEAN and the United States have developed growing strategic relations since the turn of the millennium, whereas, the European Union and ASEAN elevated their relations into a strategic partnership back in 2020 after over 20 rounds of joint ministerial meetings and summits.

Another book, in addition to the present volume, would be necessary to explore the macroeconomic and other geopolitical impacts of such transformations in the next 2 decades—in other words, toward 2045—including the development of the ASEAN+3 format, especially in the field of monetary policy.

Transforming ASEAN: Strategies for Achieving Inclusive and Sustainable Growth illustrates ADBI's commitment to supporting structural transformation and sustainable development within and beyond ASEAN. We have mobilized nearly 30 contributors from Southeast Asia and beyond to engage in serious discussions about complementary ways to envision and build ASEAN's future by (1) investing in a low-carbon economy and developing climate finance; (2) fostering comprehensive system transformations to support sustainability; and (3) deepening the multilateral legacy of the G20 and ASEAN chairmanships of Indonesia.

The book also entails ADBI's new strategic direction as an Asian and global think tank to support effective and inclusive energy transitions and address climate finance and related policies across the needs and perspectives of developed, emerging, and lower-income countries in Asia and the Pacific and beyond.

The book comprises 14 chapters divided into three parts:

Part I: Driving Southeast Asia's Low-Carbon Economy

Part I: Investing in a New and Sustainable Economy

Part III: Deepening the G20 and ASEAN Indonesia's Multilateral Legacy

Part I: Driving Southeast Asia's Low-Carbon Economy

Part I discusses key issues related to energy transition mechanisms and climate change in the ASEAN region. Several countries in the region are strongly committed to meeting international agreements on climate change and achieving effective energy transition. To successfully shift from dirty energy production to cleaner alternatives and fulfil these agreements, the ASEAN region requires clear and concise guidance and evidence-based policy recommendations.

In **Chapter 1,** "Climate Change-Induced Challenges in Southeast Asian Nations: Exploring Adaptation, Mitigation, and Climate Financing Strategies", Jena, Meher, and Rahut explore adaptation, mitigation, and climate financing strategies in the ASEAN region. Given the heavy reliance of agriculture on weather conditions, climate change poses a significant threat to food production. The chapter sheds light on the environmental challenges faced by agriculture, including greenhouse gas emissions, and the corresponding adaptation and mitigation strategies that can counteract the disruptions to food production and progress in the region.

The ASEAN region has taken decisive steps toward establishing an adaptation framework. However, the adoption of climate-resilient practices is a gradual process, particularly the traditional practices of smallholder farmers. Implementing changes in farming practices requires the presence of an extensive network of ground-level agricultural extension officers who can continuously engage with farmers to demonstrate the benefits of these practices. Simultaneously, the chapter highlights various mitigation strategies that are reflected in projects aimed at preserving and enhancing biodiversity in the region. Financing for both mitigation and adaptation efforts will play a critical role in the success of these initiatives.

In **Chapter 2**, "Toward a Low-Carbon Economy in Southeast Asia: Opportunities and Obstacles for Energy Transition Mechanisms", Kliem delves into the Energy Transition Mechanism (ETM) of the Asian Development Bank (ADB) and its potential applicability in Southeast Asia. Currently, the ETM is being tested in the region before a broader rollout can be considered. Southeast Asia serves as a suitable location for piloting the ETM, primarily due to its rapidly growing energy demand. However, a significant portion of this demand is still being met with fossil fuels, specifically oil, coal, and liquefied natural gas, as renewable alternatives do not yet have the capacity to ensure the required level of energy security. Thus, Chapter 2 discusses the energy situation in Southeast Asia and how the ETM fits into the region. It also addresses key challenges, such as the necessity for investment in a regional grid and the promotion of renewable alternatives to coal.

Southeast Asia is confronted with substantial challenges in its pursuit of achieving carbon neutrality by 2050–2060 while sustaining and enhancing economic growth. The region is experiencing a gradual increase in energy consumption, leading to a subsequent rise in carbon dioxide emissions.

In **Chapter 3**, "Low-Carbon Energy Transition Toward Carbon Neutrality for ASEAN", Kimura highlights the ASEAN pathway to carbon neutrality relative to the business-as-usual scenario. To attain carbon neutrality, it is crucial to significantly reduce final energy consumption. One way to achieve this goal is through the promotion of renewable energy, particularly in the electricity sector. Additionally, the adoption of hydrogen and carbon capture and storage (CCS) technologies in the final energy sector can play a vital role in helping ASEAN reach its carbon neutrality target by 2050 or 2060. These measures represent key steps in mitigating carbon emissions and advancing the region toward a sustainable and low-carbon future.

In **Chapter 4**, "ASEAN Green Energy Transition: From Pledges to Implementation", Charalambous addresses the challenges that ASEAN Member States (AMS) encounter during the energy transition. These challenges include constantly increasing energy demand and prices, as well as the need for effective and sustainable financing toward energy transitioning projects. The chapter identifies four areas of policy recommendations to facilitate the transition to the low-carbon economy: (i) fostering a conducive policy environment; (ii) securing a level playing field; (iii) embracing the full sustainable energy ecosystem; and (iv) broadening the scope of action.

In **Chapter 5**, "Putting Climate Change Adaptation at the Center of Promoting Low-Carbon Economies", Surry shifts focus to the importance of climate change adaptation strategies, which is overshadowed by the attention given to mitigation strategies. The author argues that placing increased emphasis on adaptation mechanisms can yield more efficient results in addressing climate change, particularly in achieving a net-zero carbon transition. The chapter proposes several recommendations, including building awareness of climate vulnerability at the country level through vulnerability assessment; implementing adequate planning; managing climate risks in projects; building on development finance institutions' Paris Alignment processes and advice; strengthening capacities of all relevant stakeholders; and disseminating knowledge. While development finance institutions, such as ADB, are critical agents of change to support countries in implementing their climate actions, these tools are increasingly accessible directly to policy makers and can help in effectively adapting to the impacts of climate change in Southeast Asia.

In reviewing the Paris Agreement and its actions taken by the countries that signed the agreement in **Chapter 6**, "Promoting Sustainable Finance and Financial Stability Through Climate-Related Corporate Disclosure in Asia", Shirai emphasizes that the current climate policy commitments and practices have fallen significantly short of the necessary measures to achieve the targets, and there is an urgent need to accelerate efforts. The chapter focuses on financial stability and sustainable financial markets in Asia through climate-related corporate disclosure.

To achieve carbon neutrality by 2050, it is crucial to not only rely on the primary responsibility of governments but also encourage private sector investments in clean energy, low-carbon technologies, and decarbonization efforts. One essential aspect for private investors in evaluating and monitoring climate-related financial risks is reliable, comparable, and consistent corporate climate-related data disclosure and reporting. Such data disclosure enables investors and financial institutions to more accurately assess investment risks and returns, thereby enhancing climate-related supervisory and regulatory frameworks in Asia.

By encouraging and promoting these efforts, the chapter argues that climate-related risk management can be improved, leading to long-term financial stability. This approach aligns with the broader goals of the Paris Agreement and fosters a more sustainable and resilient financial system in Asia and beyond.

Part II: Investing in a New and Sustainable Economy

In **Chapter 7**, 7ASEAN's Regional Economic Integration Amid the Digital and Green Growth Era, Verico and Natanael demonstrate why the ASEAN Way is well-suited to address the current and future opportunities and challenges related to ASEAN's cross-border trade and intra-investment, with the aim of accelerating economic growth. This chapter also explores the role of the digital economy in facilitating cross-border transactions involving services among AMS. The rapid growth of the ASEAN digital economy, especially in e-commerce and digital financial services, offers significant opportunities through the increasing use of digital technology, integrated financial services, and the export potential of micro, medium, and small enterprises (MSMEs) to expand their businesses. These are essential areas to consider in promoting regional economic integration.

The chapter discusses existing regional policies and frameworks that promote the digital economy and cross-border transactions in ASEAN. These policies cover various aspects, including digital integration, digital data governance, digital trade, and trade facilitation. The authors make several recommendations for ASEAN member governments to foster secure data sharing, streamline regulations for new technologies, guide MSMEs in digital exports, and enhance digital literacy and upskilling programs. They also argue that adopting the environmentally friendly direction, even though it may increase the cost of production for green energy and low-carbon consumption, will ultimately meet the growing global green demand for sustainable products and practices.

In **Chapter 8**, "Innovative Finance for Transforming Sustainable Food Security Systems in the ASEAN Region", Sarker, Trivedi, Chakraborty, and Bashir conduct a comprehensive review of the factors affecting sustainable food security in the ASEAN region. They specifically examine the impact of the COVID-19 pandemic and subsequent financial constraints that have been influencing the region's food security system. The authors also present alternative solutions to address these challenges and promote the establishment of a sustainable food security system in ASEAN member countries. One of the key issues explored in this chapter is malnutrition, and the authors propose potential solutions through the introduction of the Smart SAM-SSIS model. This model prioritizes food productivity, accessibility, and availability, with a focus on specific nations within the ASEAN region. By implementing this model, the authors aim to enhance food security and combat malnutrition in a more targeted and effective manner.

In **Chapter 9**, "Sustaining Food Security in ASEAN", Teng defines sustainable food security as a state in which all or most dimensions of availability, access, utilization, and stability are met, using current resources in a way that ensures the food security of future generations is not compromised. Despite the ASEAN region being blessed with favorable natural resources and a supportive climate for agriculture, the author highlights the challenges it faces, particularly those resulting from the changing physical environment, declining crop productivity, and demographically based food demand.

To address these challenges and work toward sustainable food security, various opportunities exist. The chapter explores the potential of disruptive technologies based on digital and biotechnology revolutions, novel environments, and novel food. Additionally, untapped trade opportunities for food import and export within ASEAN can be harnessed to enhance resilience. To achieve sustainable food security, the chapter also emphasizes the need to increase public and private investments in the agrifood sector. There are opportunities to adopt more regional approaches to address common problems, develop rapid response mechanisms to potential threats, embrace a preparedness paradigm, integrate smallholders into modern food systems, and foster human capital development for a new and transformed agriculture. By leveraging these opportunities and addressing the challenges, the ASEAN

region can work toward a sustainable food security system that ensures the well-being of both present and future generations.

The ASEAN Economic Community has responded to the COVID-19 pandemic by rapidly establishing a Comprehensive Economic Recovery Framework and strengthening digital innovation capabilities across the borders of its member countries. However, the scars of the pandemic on education systems have proven deeper than expected while the global competition to achieve green growth has intensified since 2020.

In **Chapter 10**, "ASEAN 2045: A Scientific Strategy for a New Sustainable Economy", Phan emphasizes that ASEAN needs to invest in a renewed, comprehensive, and integrated education and scientific research strategy to remain a regional and global economic powerhouse and bring a meaningful contribution to restore a fragile 2030 Agenda. Looking toward 2045 and beyond the horizon of 2025 also means a better orchestrating of ASEAN's participation to major global macroeconomic fora, starting with the G20, whereas the Global South is actively trying to overcome the post-COVID-19 debt gridlock and rebalance international financial institutions.

Part III: Deepening the G20 and ASEAN Indonesia's Multilateral Legacy

Part III focuses on the linkages between the G20 and ASEAN and their contribution to promoting sustainable development and multilateralism while addressing regional challenges.

In **Chapter 11**, "Elevating ASEAN's Role in Regional Integration Amid Geopolitical Turbulence", Damuri and Rafitrandi argue that economic cooperation has become inseparable from the political context. The authors discuss how increasing geopolitical tensions, particularly the escalation of major power competition, pose significant obstacles to economic cooperation and raise the risk of a fragmented global economy divided into competing blocs. This threatens to destabilize economic integration and cooperation in East Asia and the Pacific. However, ASEAN possesses strong convening power and is ideally positioned to respond actively to this development. The authors argue that ASEAN can play a crucial role in promoting a comprehensive security framework among its member countries and strategic partners. This approach is essential to address the challenges posed by geopolitical tensions and foster economic cooperation and stability in the region.

ASEAN's position allows it to lead the initiative for a comprehensive security framework in East Asia and the Pacific. Simultaneously, it can promote this framework among G20 countries, thereby encouraging broader cooperation and dialogue at the global level.

By taking this proactive approach and leveraging its convening power, ASEAN can play a critical role in mitigating the adverse effects of geopolitical tensions and contribute to creating a more stable, integrated, and cooperative economic environment in the region and beyond.

In **Chapter 12**, "ASEAN's Voice in the G20: Enabling Trade Integration and Global Value Chain Resilience in Developing Economies", Prakash scrutinizes the importance of trade integration and global value chain (GVC) resilience in developing economies. Starting with Indonesia in 2022, four consecutive presidencies of G20 are also developing economies. This creates opportunities to experiment with new forms of cooperation on global challenges.

ASEAN benefits from the continuity in the G20 agenda, especially in the crucial finance track and the trade and investment working group. The G20's focus on issues like MSMEs, supply chains, and predictability of global trade during India's presidency in 2023 aligns with the objectives of the ASEAN Community Vision 2025.

The active involvement of developing economies in the G20 and the alignment of its agenda with ASEAN's objectives provide a platform for addressing global challenges and fostering economic growth and resilience in the region. By leveraging these opportunities, ASEAN can continue to play a significant role in the global economy and contribute to sustainable development and cooperation on a global scale.

In **Chapter 13**, "ASEAN in the Global Economy", Ing and Markus focus on the role of ASEAN in the global economy. They highlight the significant contributions of developing countries, particularly the Republic of Korea and Southeast Asia (ASEAN), to world GDP, world trade, and world value-added in the manufacturing sector. As the ASEAN region is emerging, ASEAN should take more active responsibility in the global economy by reinforcing a consistent agenda on sustainable and inclusive global economic recovery, global peace promotion, and climate change, among others, which align with the G20 agendas. Meanwhile, the G20's focus should shift to the increasing economic and political role of emerging economies, including ASEAN, the African Union, and other emerging middle power countries, and consider their input in global solutions.

In the final **Chapter 14**, "Governance and Complementarity of ASEAN and G20 Cooperation", Qibthiyyah and Maizar discuss the governance and structure of ASEAN and G20 cooperation. It chapter explores the role of these forums in raising stakeholders' awareness and how their priorities and initiatives have evolved over time. The authors emphasize the potential of cooperation between the G20 and ASEAN to enhance the effectiveness of their processes and overcome the limitations of independent actions.

The fact that Indonesia held the G20 presidency in 2022 and is leading the ASEAN chairmanship in 2023 creates an opportunity to strengthen cooperation between the two forums. With ASEAN having dialogue partnerships with 11 countries, 10 of which are G20 member countries, establishing linkages between G20 and ASEAN can strengthen existing cooperation and foster greater collaboration between the two entities. By leveraging this opportunity for cooperation, the G20 and ASEAN can work together to address regional challenges, promote sustainable development, and enhance overall effectiveness.

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PART I

Driving Southeast Asia's Low-Carbon Economy

CHAPTER 1

Climate Change-Induced Challenges in Southeast Asian Nations: Exploring Adaptation, Mitigation, and Climate Financing Strategies

Pradyot Ranjan Jena, Sunil Meher, and Dil B. Rahut

1.1 Introduction

As agriculture depends on weather conditions, climate change severely affects food production (Rahut et al. 2022; Rahul, Aryal, and Marenya 2021a, 2021b). About 60% of crop yield variability can be influenced by climatic conditions, making climate an essential factor for food production (Osborne and Wheeler 2013; Ray et al. 2015; Matiu, Ankerst, and Menzel 2017). Due to climate change, the duration of the growing seasons of the crops is changing, making it harder for farmers to make decisions on the start of the sowing and application of inputs (Fiwa et al. 2014; Zhao et al. 2015; Lemma et al. 2016). Higher than optimal temperatures harm crop growth and crop nutrient content. Studies show that despite adaptation, global warming has reduced crop yield by 17% between 1991 and 2012 (Kalli and Jena 2020). One influential study on Asian countries established that a rise in temperature by 1.5^{0}C and 3^{0}C would lead to a monetary loss of $18 billion and $84 billion, respectively (Mendelsohn 2014). Climate change has a significant impact on underdeveloped nations due to their dependency on agriculture (Thornton and Herrero 2014). Climate change is expected to lower rain-fed maize production by 3.3%–6.4% in 2030 and 5.2%–12.2% in 2050, and irrigated yield by 3%–8% in 2030 and 5%–14% in 2050 if present varieties are cultivated (Tesfaye et al. 2017). Climate change has a negative impact not only on crop yields and production but also on natural resources, particularly land and water, which are critical to agricultural output. Climate change is likely to reduce water availability, while agricultural water usage is estimated to rise by 19% by 2050 (Molden 2013).

The Association of Southeast Asian Nations (ASEAN), a political and economic association of 10 countries in Southeast Asia, is uniquely susceptible to the far-reaching consequences of climate change. This vulnerability is underscored by compelling evidence from the Global Climate Risk Index (CRI) 2020, which illuminates the alarming impact of extreme climate events on several ASEAN countries over the last 2 decades. Among the nations within this region, e.g., Myanmar, the Philippines, Viet Nam, and Thailand, a distressing pattern emerges, positioning them among the top 10 countries most severely affected by these climatic disturbances between 1999 and 2018, as determined by the CRI (Eckstein et al. 2019). Myanmar emerged with the highest CRI score of 10.3, followed closely by the Philippines, with a CRI score of 17.67. Viet Nam and Thailand, similarly impacted, recorded CRI scores of 29.83 and 31.00, respectively.

Climate change profoundly influences international affairs, manifesting in various dimensions. To begin with, the modifications in climatic conditions, encompassing phenomena like rising sea levels, droughts, floods, and storms, can significantly impact relations between nations. These climatic shifts can give rise to humanitarian crises, fast population displacement through migration, intensified reliance on imports for vital commodities, and even fuel conflicts (Brzoska and Frölich 2016; Buhaug et al. 2014). Second, climate change represents a global predicament requiring concerted efforts and international cooperation to curtail greenhouse gas emissions effectively. Tackling this pressing issue demands collective action rather than solitary endeavors undertaken solely by individual countries. Collaboration and coordination on a global scale have become imperative.

Against this backdrop, the current study examines the prospects of a smallholder production system in ASEAN to adapt to climatic variability to minimize the negative impacts of climate change on food systems. The study first demonstrates the extent of greenhouse gas (GHG) emissions from the agriculture sector in Southeast Asian countries. This analysis shows the threat of climate change to food security if this trend of emissions continues unabated. Second, we put forward the adaptation to climate change initiatives taken up by these countries and the way forward in adopting climate-smart technologies. Third, the study discusses the mitigation measures undertaken by these countries. Finally, the allocation of climate finances for adaptation to climate change in the agriculture sector is discussed.

1.2 Greenhouse Gas Emissions Threat to ASEAN Agriculture

Southeast Asia is home to a significant concentration of countries highly impacted by climate change, as highlighted by the Global Climate Risk Index. Four of the top 10 nations globally affected by climate change belong to this region: Myanmar, the Philippines, Thailand, and Viet Nam. Neighboring Bangladesh also ranks itself within the same group (Kreft, Eckstein, and Melchior 2016). The melting of ice caused by global warming is one of the most tangible outcomes, resulting in elevated sea levels. Along the coastlines of Southeast Asia, where over 50 cities harbor more than half a million inhabitants each, the concentration of population and economic activity is significant. A comprehensive study predicts a significant annual temperature increase of 4.8°C and a projected sea level rise of 70 centimeters by 2100, with particular impact on Indonesia, the Philippines, Thailand, and Viet Nam (Vinke et al. 2017; Levermann et al. 2013).

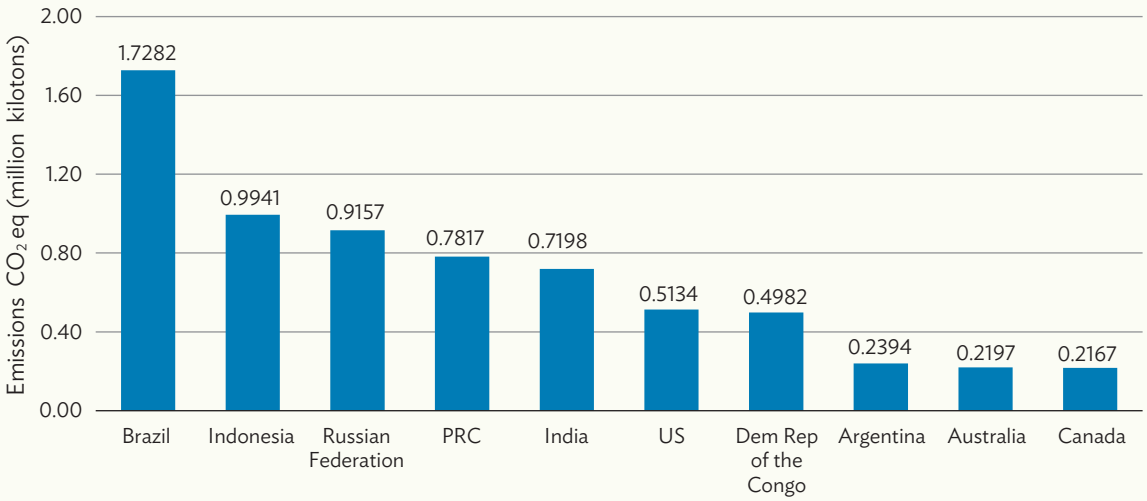
According to the Our World in Data map, Indonesia emerged as the country with the highest GHG emissions in the ASEAN region in 2021, recording 2.05 billion tons. Following Indonesia, Viet Nam ranks second with 507.34 million tons, while Thailand ranks third with 452.12 million tons. Conversely, Timor-Leste exhibits the lowest GHG emissions at 9.38 million tons, along with Brunei Darussalam with 17.20 million tons, Singapore with 38.92 million tons, the Lao People's Democratic Republic with 67.92 million tons, and Cambodia with 80.27 million tons (Greenhouse gas emissions include carbon dioxide, methane, and nitrous oxide from all sources, including agriculture and land use change. They are measured in carbon dioxide-equivalents (CO_2 eq) over a 100-year timescale).

1.2.1 Unravelling Greenhouse Gas Emissions in the ASEAN Region

The ASEAN nations encounter significant possibilities and problems regarding agricultural GHG emissions, activities related to agriculture, forestry, and other land use are essential for the region's food supply and rural livelihoods. However, they also significantly affect anthropogenic GHG emissions (Smith et al. 2014).

Figure 1.1 illustrates the emissions of CO_2 eq from agricultural land, and in this context, wherein Indonesia is placed in second position among other nations such as Brazil, India, the People's Republic of China (PRC), the Russian Federation, and the United States, indicating a significant contribution to GHG emissions in the agriculture sector. This highlights the importance of addressing agricultural emissions and implementing sustainable practices in the ASEAN region to mitigate the impact of agriculture on climate change.

Figure 1.1: Top 10 GHG Emitters on Agricultural Land

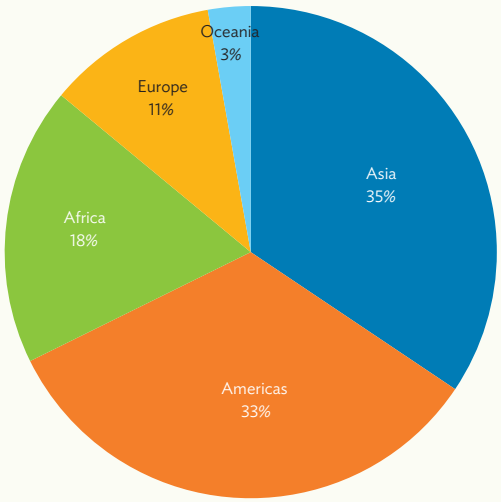


GHG = greenhouse gas, PRC = People's Republic of China, US = United States.

Source: FAOSTAT. https://www.fao.org (accessed 23 June 2023).

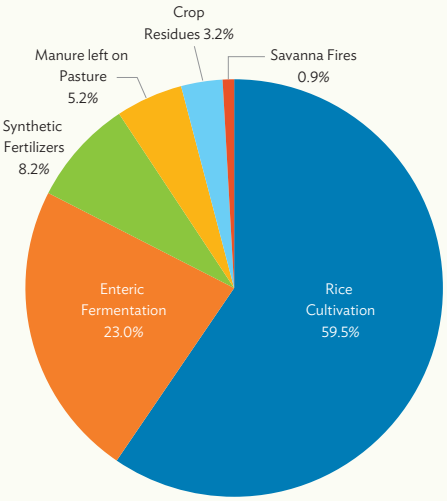
In terms of GHG emissions by continent, Figure 1.2 reveals that the highest contribution comes from Asia, accounting for 34% of global emissions, followed closely by the Americas at 33.3%. Moving on to Figure 1.3, the data represent the average emissions from 1990 to 2020 from agriculture, with rice cultivation standing out as the most significant contributor with a share of 59.5%, followed by enteric fermentation at 23%, and synthetic fertilizer at 8.2% as indicated by the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT).

Figure 1.2: Share of Emissions by Continent, Emissions from Agriculture (CO_2 eq)



Source: FAOSTAT. https://www.fao.org (accessed 23 June 2023).

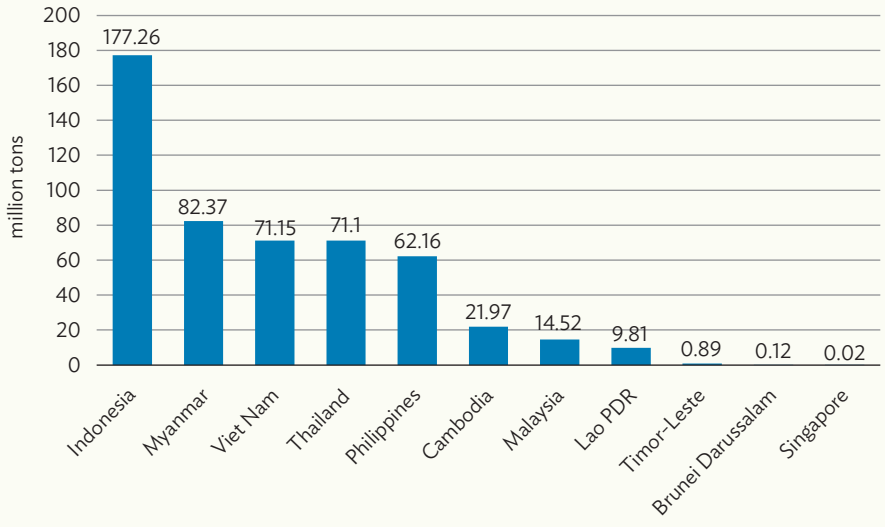
Figure 1.3: Emissions Share by Different Components of Agriculture, Southeast Asia



Source: FAOSTAT. https://www.fao.org (accessed 23 June 2023).

Based on data from Our World in Data (Figure 1.6), Indonesia stands out as the largest emitter of agricultural GHG in the ASEAN region, with emissions totaling 176.94 million tons (mt). Myanmar, Viet Nam, and Thailand follow it, while Singapore (20,000 mt) and Brunei Darussalam (120,000 mt) have lower emissions. GHG emissions are measured in CO_2 equivalents, where non-CO_2 gases are converted into their CO_2 equivalent values.

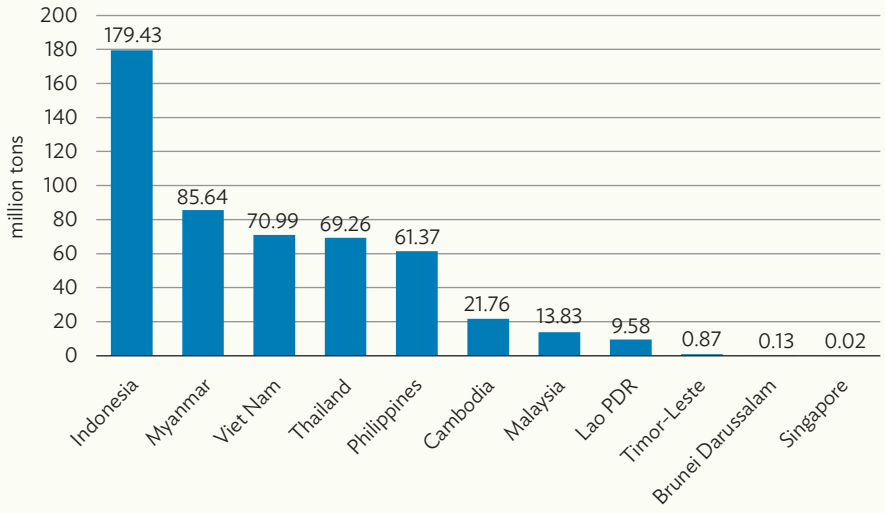
Figure 1.4: Total GHG Emissions from Agriculture Sector, 2017



GHG = greenhouse gas, Lao PDR = Lao People's Democratic Republic.

Source: Our World in Data. https://ourworldindata.org/CO2-and-greenhouse-gas-emission (accessed 20 June 2023).

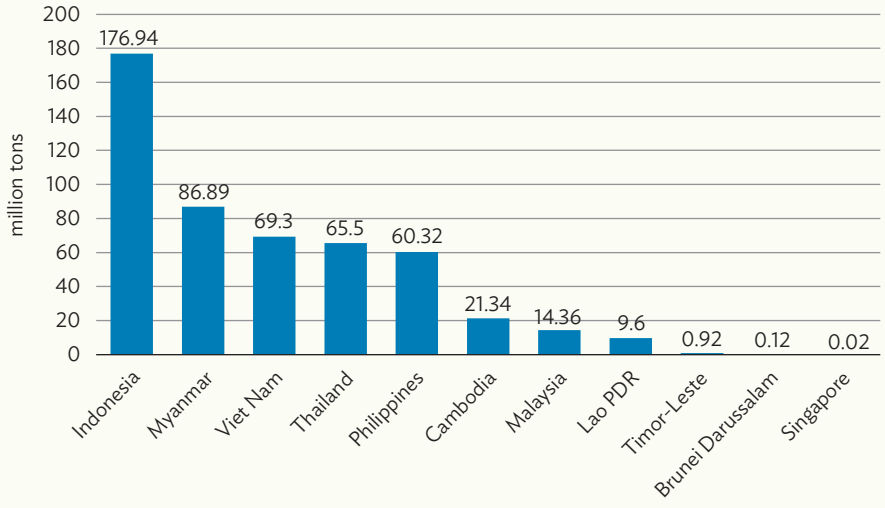
Figure 1.5: Total GHG Emissions from Agriculture Sector, 2018



GHG = greenhouse gas, Lao PDR = Lao People's Democratic Republic.

Source: Our World in Data. https://ourworldindata.org/ CO_2-and-greenhouse-gas-emission (accessed 20 June 2023).

Figure 1.6: Total GHG Emissions from Agriculture Sector, 2019



GHG = greenhouse gas, Lao PDR = Lao People's Democratic Republic.

Source: Our World in Data. https://ourworldindata.org/CO_2-and-greenhouse-gas-emission (accessed 20 June 2023).

Deforestation is one of the leading causes of emissions in the agriculture industry. Due to land conversion for agriculture, notably for large-scale commercial farming and palm oil plantations, which release carbon held in trees and diminish the forests' ability to absorb CO_2 (Smith et al. 2014), deforestation has occurred extensively across ASEAN countries. Agricultural development in peatlands drove economic growth but incurred excessive costs. Between 2007 and 2018, it generated around $48 billion (5.7% of gross domestic product, GDP), but air pollution and fire damage offset over half of this. Measures for fire prevention and peatland restoration are now reducing these costs. Urban congestion from personal vehicles costs about 0.5% of GDP, while air pollution shortens the average Indonesian citizen's life expectancy by 1 to 4 years (Greenstone and Fan 2019). Forests provide various ecological services beyond their local surroundings, such as air filtration, groundwater replenishment, and temperature regulation. Forests offer economic advantages and improve community resilience at the local level, notably during natural catastrophes. ASEAN nations rely on these services for their social and economic growth. High deforestation rates, however, pose serious dangers, as do predicted habitat and biodiversity losses of up to 40% by 2100. Such losses may deprive the region of critical forest services, making it vulnerable to natural occurrences and variability (Estoque et al. 2019).

1.3 Climate Change Adaptation Measures in the Agriculture Sector in ASEAN Countries

The ASEAN member states have made significant progress in tackling climate change adaptation and disaster risk reduction by establishing institutional processes and policies. These initiatives have been included in national programs as a sign of the ASEAN member nations' dedication to combating climate change. The ASEAN nations have included climate change concerns in their development plans to recognize the significance of climate change adaptation and disaster risk reduction. To help with disaster response and implementation, they have created disaster risk management rules and legislation at the national level. While several nations are working to pass disaster risk management legislation, significant advancements have been achieved.

Numerous existing agricultural management practices hold the potential for optimization and broader implementation to bolster adaptation efforts (Aryal et al. 2020, 2021). Extensively explored adaptation options encompass on-farm practices and biophysical measures, such as enhancing soil organic matter, refining cropland management techniques, leveraging local genetic diversity, improving livestock management, implementing crop–livestock mixed systems, adopting multiple cropping methods, enhancing grazing land management, augmenting food productivity, preventing and reversing soil erosion, and embracing agroecological approaches (Altieri and Koohafkan 2008). Nonetheless, Nie et al. (2016) raised valid concerns regarding integrated crop–livestock systems as adaptation strategies, citing challenges like potential yield reduction, difficulties in pasture cropping, grazing, and groundcover maintenance in high-rainfall zones, as well as the emergence of persistent weeds and pests.

1.3.1 Soil Management

Effective soil management is a critical component of climate change adaptation, as the soil contains essential minerals necessary for crop growth. Numerous studies (Bhattacharyya et al. 2015); (Bedano et al. 2016; Chen et al. 2017; Cui et al. 2017; He et al. 2018) highlight the importance of soil management in adaptation efforts. Climate variability and extreme events, such as heavy rainfall and strong winds, can accelerate soil erosion. Strategies like tree planting and hedgerow establishment are employed in semi-arid regions to combat wind-induced erosion. At the same time, humid and coastal areas commonly utilize measures like vegetation cover, contour plowing, and contour hedgerows.

Techniques such as mini-irrigation facilities, water harvesting, and terrace farming are implemented in mountainous regions to control soil erosion. Shifting from traditional tillage practices to zero tillage and minimum tillage with residue retention facilitate adaptation to water stress, excessive rainfall, and high temperatures in cropping systems (Sapkota et al. 2015). Modifying tillage practices effectively mitigated high temperatures (reducing canopy temperature by 1°C–4°C) and significantly improved irrigation water productivity (66%–100%) compared to conventional production systems, thus enhancing resilience to water and heat stress. The sequestration of soil organic carbon emerges as a crucial strategy for mitigating climate change and strengthening overall soil quality. Effective soil management increases water efficiency in agricultural practices and helps improve overall soil health, giving more productivity.

1.3.2 Crop Diversification, Cropping System Optimization, and Management

Climate change poses a significant threat to agriculture's sustainability, affecting biotic factors, such as pests and pathogens, and abiotic factors, including variations in solar radiation, water availability, and temperature. To enhance the resilience of agricultural systems in climate change, crop diversification strategies have been identified as a rational and cost-effective approach (Lin 2011). By diversifying crops in terms of spatial distribution and temporal rotation, agricultural systems can build resilience and mitigate the adverse effects of climate change. Diverse production systems contribute to food and nutritional security and provide essential regulatory ecosystems services such as nutrient cycling, carbon sequestration, soil erosion control, reduction in greenhouse gas emissions, and regulation of hydrological processes (Chivenge et al. 2015). Crop diversification is crucial in enhancing resilience to climate change by promoting natural pest suppression and reducing the risk of pathogen transmission, especially in the face of increased climatic variability. For example, planting disease-susceptible rice varieties in mixtures with resistant varieties across extensive areas resulted in a significant increase in yield (89%) and a substantial reduction in fungal blast occurrence (94%) compared to monoculture planting (Lin 2011).

1.3.3 Water Management

Rising temperatures can harm agriculture by influencing cropping seasons, increasing evapotranspiration rates, raising irrigation water demands, and causing heat stress. One approach to mitigate the adverse impacts of climate risks is to introduce short-duration crop varieties and plant early or late-maturing varieties. This strategy effectively enhances yields and minimizes the negative consequences of climate change. In India, for example, implementing short-duration and improved varieties of pigeon pea, soybean, wheat, and sorghum resulted in yield improvements of 75%, 15%, 27%, and 91%, respectively (Sonune and Mane 2018). Water management strategies in agriculture, such as water harvesting and laser field leveling, can be effective methods of adapting to water stress. Water harvesting, an old Indian tradition, involves collecting rainwater and can assist in alleviating irrigation water deficiencies throughout the year (Satapathy et al. 2011). This practice is also used by 35% of families in rural Bangladesh's coastal areas to reduce runoff and recharge groundwater levels (Ferdausi and Bolkland 2000). Laser land leveling has gain importance in India's irrigated rice-wheat systems because it improves water-use efficiency. Laser land leveling, for example, reduced irrigation time in rice fields by 47–69 hours per hectare per season, and in wheat fields by 10–12 hours per hectare per season (Aryal et al. 2015). Significant water savings were observed in various crops, including rice, wheat, maize, and cotton, ranging from 22% to 43%, in fields leveled with lasers (Jat et al. 2014).

Micro-irrigation methods, such as sprinklers and drip irrigation, can also help conserve water, saving anywhere from 12% to 84% of the water used, depending on the location and crops planted (Kumar 2016). The System of Rice Intensification (SRI) is a collection of agricultural, soil, and water management

strategies. It entails individually transplanting young seedlings and intermittently irrigating rice fields to keep them moist and aerated. The SRI has been shown to enhance crop productivity by more than 10%, while consuming 25% to 47% less water in countries such as India, the People's Republic of China, and Nepal (Barah 2009; Wu, Ma, and Uphoff 2015; Reeves, Thomas, and Ramsay 2016). The SRI reduces production costs, increases farmers' income, and minimizes the risk of crop losses, allowing for land utilization for other crops.

Furthermore, rice plants produced utilizing SRI approaches have higher tolerance to biotic and abiotic challenges related to climate change, such as heat stress, drought stress, flooding, storms, and diseases (Barah 2009; Wu, Ma, and Uphoff 2015; Reeves, Thomas, and Ramsay 2016). Overall, these water management approaches improve farmers' adaptive ability and income, while also contributing to sustainable agriculture by saving water resources and strengthening resistance to the effects of climate change.

Water harvesting is a popular water management strategy that involves collecting and storing rainwater for agricultural use. This approach has been widely implemented in ASEAN nations and has effectively eased seasonal irrigation water shortfalls.

Implementing micro-irrigation systems, such as sprinklers and drip irrigation, has also demonstrated substantial potential for water conservation in ASEAN countries. Depending on the location and crops, micro-irrigation systems can achieve water savings ranging from 12% to 84% (Kumar 2016). These systems deliver water efficiently directly to the plant roots, minimizing losses due to evaporation and runoff.

1.3.4 Sustainable Land Management

Various sustainable land management practices, including agroforestry, conservation agriculture, sustainable intensification, and optimization of cropping systems, facilitate climate change adaptation. Among these practices, sustainable intensification has gained significant international recognition (Godfray 2015). It recognizes the importance of increasing productivity, maintaining other ecosystem services, and building resilience to shocks (Vanlauwe et al. 2015).

Agroforestry is an important component of ASEAN countries' sustainable land management strategy. Agroforestry is the integration of trees with agriculture and animal systems to mitigate climate change through carbon storage, enhanced soil fertility, and decreased soil erosion (Dixon et al. 2019). Furthermore, agroforestry systems provide benefits to farmers, including improved water control, greater biodiversity, and varied revenue streams.

Conservation agriculture is another important strategy for sustainable land management in ASEAN countries. It includes techniques that reduce soil disturbance, preserve soil cover, and increase crop diversification. Conservation agriculture enhances soil health, promotes water infiltration, and lowers soil erosion through techniques such as decreased tillage, cover cropping, and crop rotation, hence increasing agricultural system resilience to climate change impacts (Kassam, Friedrich, and Derpsch 2019).

Sustainable intensification is a crucial idea in ASEAN nations' sustainable land management. It recognizes the need to increase agricultural output, while preserving environmental services and boosting resilience to shocks. Improved fertilizer management, effective water usage, integrated pest control, and the adoption of climate-smart agricultural practices are all part of achieving sustainable

intensification (Vanlauwe et al. 2015). ASEAN nations want to boost agricultural productivity by employing sustainable intensification strategies that have a low environmental effect.

Cropping system optimization constitutes another approach to sustainable land management in ASEAN countries. It involves designing and managing cropping systems that maximize resource use efficiency, minimize environmental degradation, and enhance resilience to climate change. This includes selecting appropriate crop varieties, optimal planting dates, and integrating agroecological principles into farming systems (Settle, Hossain, and Kropff 2017). Cropping system optimization endeavors to improve yields, reduce input requirements, and enhance the adaptability of agricultural systems to changing climatic conditions.

1.4 Greenhouse Gas Mitigation Options in the Agriculture Sector and their Abatement Potential

Improved agricultural practices have a double positive impact by minimizing greenhouse gas (GHG) emissions from agroecosystems and conserving atmospheric carbon in terrestrial ecosystems (Sapkota, Lal, and Singh 2017a, 2017b). According to Smith et al. (2008), methane (CH_4) and nitrous oxide (N_2O) are primarily responsible for the 14% yearly rise in anthropogenic GHG emissions attributed to agriculture. Therefore, there is an excellent possibility for lowering GHG emissions by applying mitigation measures in agriculture (Nelson 2009). To mitigate this, the agricultural industry may sequester CO_2 and reduce CH_4 and N_2O emissions. For instance, livestock can help mitigate climate change by reducing emissions and storing carbon in the soil (Mottet and Tempio 2017).

According to the Intergovernmental Panel on Climate Change (IPCC 2014), deforestation, livestock, soil, and fertilizer management account for around 24% (10–12 gigatons of CO_2 eq per year) of the anthropogenic GHG emissions in the agriculture, forestry, and other land use sectors. Despite the challenges posed by GHG emissions, agriculture in ASEAN countries also presents opportunities for climate mitigation. Implementing sustainable agricultural practices, such as agroforestry, organic farming, and conservation agriculture, can help sequester carbon in soils and vegetation, reducing net emissions (Smith et al. 2014). Moreover, adopting climate-smart agricultural techniques, including improved crop varieties, water-efficient irrigation systems, and precision agriculture, can enhance productivity while minimizing emissions (Smith et al. 2014).

Improvements in livestock management practices and water management strategies like alternating wetting and drying in rice farming are part of mitigation efforts. For sustainable agriculture and efficient climate change mitigation in the ASEAN area, CH_4 emissions from livestock and rice farming must be reduced (Gerber et al. 2013; IRRI 2018). The ASEAN agriculture industry will be more resilient and sustainable if these emissions are reduced.

Most ASEAN member states have established a registration system for mitigation policies and adaptation measures (PAMs) to increase transparency and make reporting and progress evaluation easier. This approach supports the Paris Agreement's emphasis on clarity and openness and enables successful implementation by ministries, local governments, enterprises, and civil society organizations. Prioritizing PAMs and engaging local governments and communities in attaining Nationally Determined Contributions (NDCs) still present obstacles. Despite current legislation, PAMs are only sometimes enforced effectively in certain ASEAN member states. Operational monitoring, reporting, and verification systems that are pertinent to NDCs and use cutting-edge data systems on policy information are required to overcome these problems.

In their NDCs, ASEAN member states have a variety of goals to reduce GHG emissions. While some ASEAN member states have absolute emissions reduction objectives, GHG intensity reduction targets, or policy and action targets, others have NDC targets based on business-as-usual (BAU) emissions. Projecting BAU emissions and emissions with measures is essential for successful goal formulation. The utility of different mitigation scenarios, the necessity of solid methodology and assumptions, the necessity of full GHG coverage in estimation, and the harmonization of methodologies for validation purposes are some critical lessons to be learned. Sector-specific estimation, the unpredictability of BAU emissions forecasts, and the management and sharing of data used for emissions projections continue to be problems. The validity of BAU-related emissions reduction objectives in long-term plans is further limited since long-term BAU scenarios could not effectively describe societal and behavioral changes. Building modelling technique capacity can improve policy attribution verification and projection accuracy, resulting in more accurate policy implementation across all ASEAN member states. Building capacity for BAU forecasts is essential for assessing GHG reduction potentials because the ability to predict BAU emissions with measures directly relates to the ability to estimate ex ante GHG emissions reduction. Several ASEAN member states use the transparent technique of action-based estimation of emissions reduction, notably in sectors. Although some ASEAN member states have estimated action-based reductions, it is still difficult to conduct meaningful estimation in the forestry, land use, and agriculture sectors. This component is crucial for comprehending ASEAN's NDC mitigation goals since it enables accurate determination of support budget requirements. To prioritize mitigation efforts, the ASEAN member states have done cost calculations using a least-cost method and cost-benefit analysis. However, it is essential to gather the most recent information on the prices of developing low- and zero-carbon technologies. Ex post evaluation of GHG reductions necessitates that ASEAN member states provide counterfactual BAU emissions estimates, routinely update base years, and consider natural variability such as the El Nino Southern Oscillation, which influences forestry, land use, and agriculture sector emissions. Ex ante assessment of future GHG emissions reduction in ASEAN member states should be informed by the lessons from ex post evaluations, considering the effect of natural variability on NDC objectives.

1.4.1 Mitigation Strategies through Renewable Energy Policy and Other Policies

The ASEAN member states renewable energy industry presents substantial growth potential and needs careful policy attention. To meet the mid-century decarbonization targets, ASEAN member states can enhance their use of renewable energy sources, such as wind and solar. In the NDCs of all ASEAN member states, regulatory measures, such as renewable energy objectives and regulations, are described, with most nations setting precise targets for deploying renewable energy. Being the only ASEAN member state to implement tradable renewable energy certificates, Viet Nam stands apart. However, the ASEAN member states still need to adopt renewable energy mandates. Over half of the ASEAN member states have implemented policies that assist the renewable energy industry through tax incentives, public investments, loans, grants, subsidies, and rebates. Additionally, several ASEAN nations have used energy production rewards, investment and/or production tax credits, and tendering procedures to promote the growth of renewable energy sources.

1.4.2 Technology Development and Transfer for Decarbonization

Sectoral and cross-sectoral mitigation technologies have been ranked as high priorities by ASEAN member states for attaining their NDCs by 2030. The long-term transition to net-zero emissions depends on these technologies. The main mitigating measures are raising the proportion of renewable energy, enhancing energy efficiency across industries, putting sustainable waste management procedures into place, and maintaining carbon sinks in forests. When evaluating low-carbon technologies for

mitigation, the ASEAN member states have undertaken technological needs assessments, considering financial gains, the ability to reduce GHGs, capacity, cost, and environmental and social implications. To scale up low-carbon technology, the ASEAN member states must overcome obstacles in finance, institutional structures, and legal frameworks.

Developing and transferring technologies aligned with the required infrastructure is crucial to decarbonize the energy system and achieve net-zero emissions. Renewable energy, electrification, power storage, and transmission technologies are vital in cross-sector decarbonization. Electrifying transportation ensures flexibility in the power system and integrates with the sector for decarbonization. Future electrification coupled with renewable energy can produce green hydrogen through electrolysis. Identifying transient technologies for decarbonization, considering national circumstances and alternative clean energy options, is essential for the transition to net-zero energy and land systems. While improving energy and fuel efficiency and deploying carbon capture and storage technologies can be considered for fossil fuel utilization, they risk becoming stranded assets as renewable energy becomes more cost competitive. Biomass, geothermal, hydro, wind, and solar power have already achieved cost competitiveness with fossil fuels. Nuclear power requires comprehensive assessment for social acceptability, safety, and cost. Limiting biofuel use to aviation, shipping, and petrochemicals can mitigate land use pressure. Steadily expanding solar and wind power and other renewable sources is necessary. Monitoring global market trends and retaining diverse options are crucial for net-zero emissions.

1.5 Funding the Fight: Financing Adaptation and Mitigation in ASEAN

Securing adequate financing for climate change adaptation poses significant challenges in the ASEAN region. The fragmented nature of funding and limited availability of precise financial data hinders the process. National funding is based on government funds and donations from the commercial sector through corporate social responsibility programs. International financing sources include various funds and bilateral arrangements. However, there is an imbalance in funding between adaptation and mitigation, with a larger share allocated to mitigation. Cambodia, Malaysia, Myanmar, and the Philippines received higher proportions for adaptation. Costs can be reduced by strategies such as mainstreaming adaptation into development and utilizing synergies. Fiscal discipline, climate budget labeling, and efficient government expenditure can all help to improve financial efficiency. Private sector finance still needs to be tapped. Climate-proofing measures and regulations can alleviate burdens on national budgets. Accessing international funds is challenging due to fragmentation and bureaucracy. Strengthening the capacity to develop robust funding proposals is necessary. Despite increasing adaptation financing, a gap exists in meeting countries' needs. Improved coordination, capacity building, and innovative funding mechanisms are crucial to support adaptation efforts effectively. Addressing these challenges will require collective efforts and stakeholder coordination to ensure sufficient support for climate change adaptation in the ASEAN region.

It is essential to have a thorough understanding of financial flows to scale up mitigation finance efficiently and increase its effectiveness. According to the Organisation for Economic Co-operation and Development (OECD) data, the ASEAN area receives $3.2 billion annually in international development climate money, including adaptation and mitigation. This amount increases to $6 billion annually when initiatives with climate co-benefits are considered (UNFCCC 2019). The tracking and distribution of financial resources for combating climate change are improved using budget tagging methods like the Enhanced Climate Budget Tagging System and climate change expenditure tagging. These technologies enhance the public–private partnership financing system by improving project

evaluation, prioritization, and labeling connected to climate change. Accurate budget planning and lifetime cost considerations are also made possible by undertaking sector-specific cost projections in line with NDC scenarios.

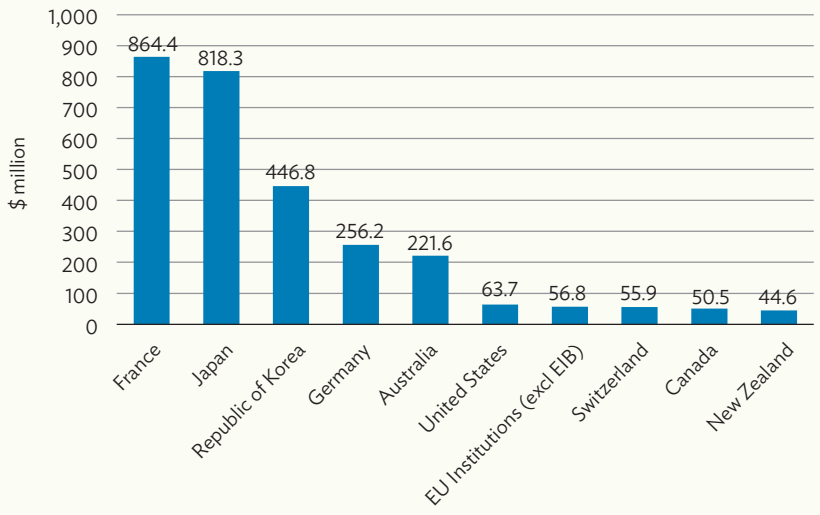
1.5.1 The Trend of Climate-related Development Finance

There is an uneven trend in the finance received over the years; it can be easily seen that 2021 got less finance than 2020 (OECD 2023). Indonesia, the Philippines, and Viet Nam are the ASEAN region's top three climate finance recipients. The countries with the most significant populations, notably Indonesia, the Philippines, and Viet Nam, emerged as the significant beneficiaries among the ASEAN countries that received aid mobilized by developed countries over the previous 20 years. However, the Lao People's Democratic Republic (Lao PDR), Cambodia, and Viet Nam were the top three aid receivers regarding amounts given per person. Notably, aid per person was larger in Cambodia and the Lao PDR than in other countries in the region with lower per-capita GDP levels. While Cambodia and the Lao PDR received an average per-capita climate aid of $9.39 and $11.39 for the 20 years, respectively, Myanmar, the nation with the lowest GDP per capita at $1,250.7, received a very small average of $4.30, according to 2019 OECD data.

1.5.2 Climate-related Development Finance

With an investment of almost $864.4 million, France has surpassed Japan's $818.3 million contribution to become the region's most significant donor in the present context. Figure 1.7 shows that the Republic of Korea is third with $446.8 million. Figure 1.8 shows the breakdown of climate funding by the financial instruments used for it. The debt instruments were the major contributor comprising of 67% followed by grants with 33%. Among the many sectors, a sizable amount of funding—$568.3 million—was given to the "other multi-sector" category, while the water supply and sanitation sector received $549.1 million. As seen in Figure 1.9, the environment protection industry came in at number five with $283.6 million, while the agricultural industry came in at number seven with $194.3 million.

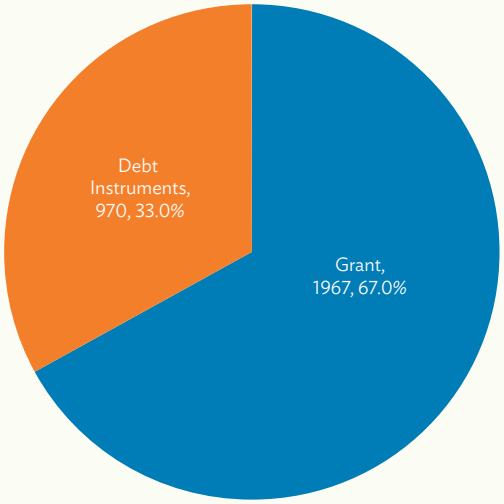
Figure 1.7: Top 10 Climate Finance Providers, 2021



EIB = European Investment Bank, EU = European Union.

Source: OECD. https://www.oecd.org (accessed 23 June 2023).

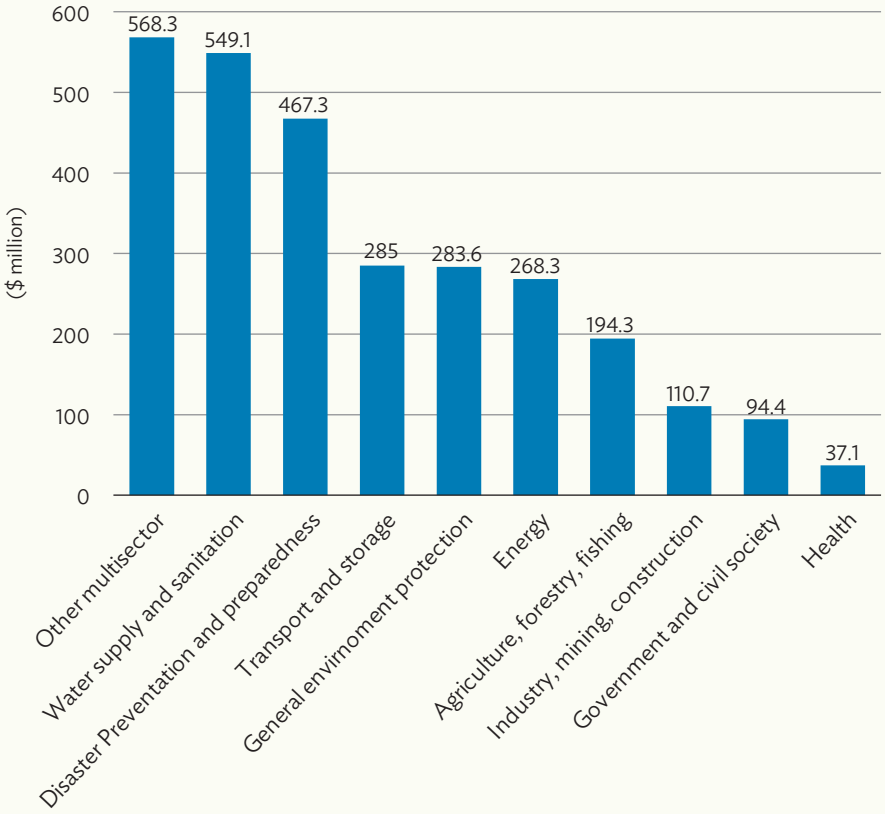
Figure 1.8: Financial Instruments, 2021



Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

Figure 1.9: Top 10 Sectors Finance Recipients, 2021



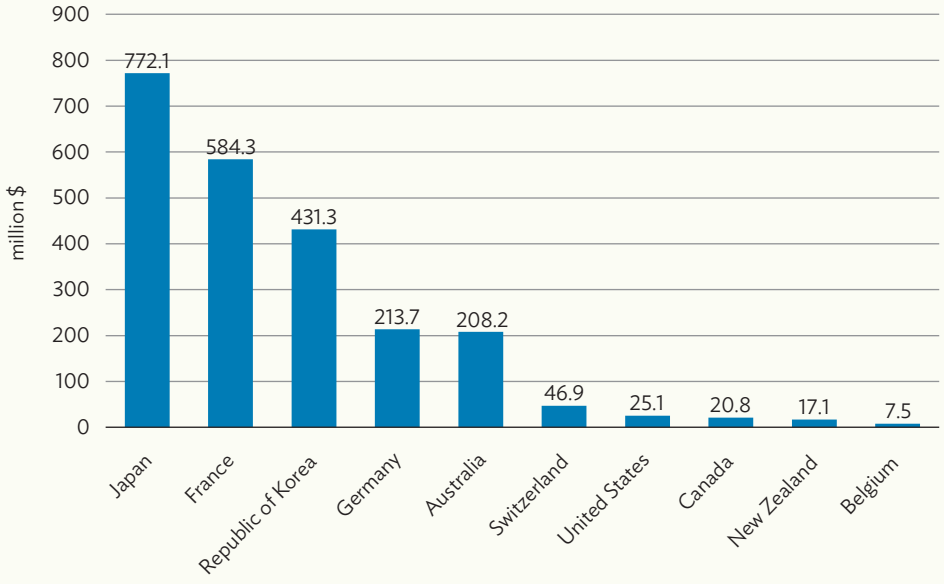
Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

1.5.3 Adaptation Financing

According to the 2021 OECD database, in terms of adaptation financing, Japan emerged as the most significant contributor with a total of $772.1 million, followed by France with $584.3 million and the Republic of Korea with $431.3 million, as illustrated in Figure 1.10. When examining the distribution across sectors, the highest financial assistance was allocated to the "other multi-sector" category, receiving a total of $552.3 million, followed closely by the water supply and sanitation sector, which received $524.6 million. The environment protection sector ranked fifth, receiving $185.9 million, while the agriculture sector obtained $164.4 million, placing it in the seventh position, as depicted in Figure 1.11.

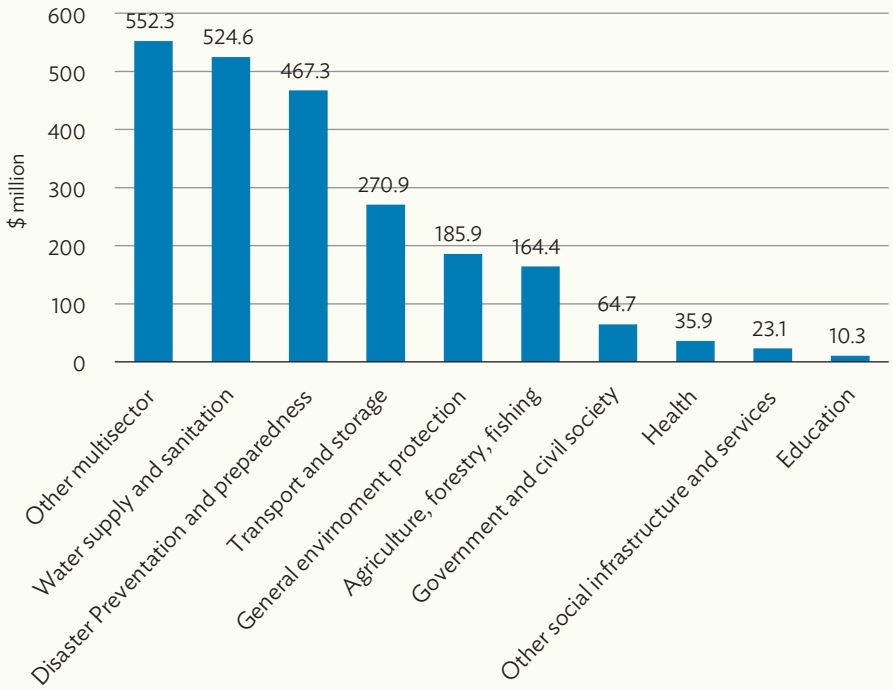
Figure 1.10: Top 10 Climate Finance Providers, 2021



Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

Figure 1.11: Top 10 Sectors Finance Recipients, 2021



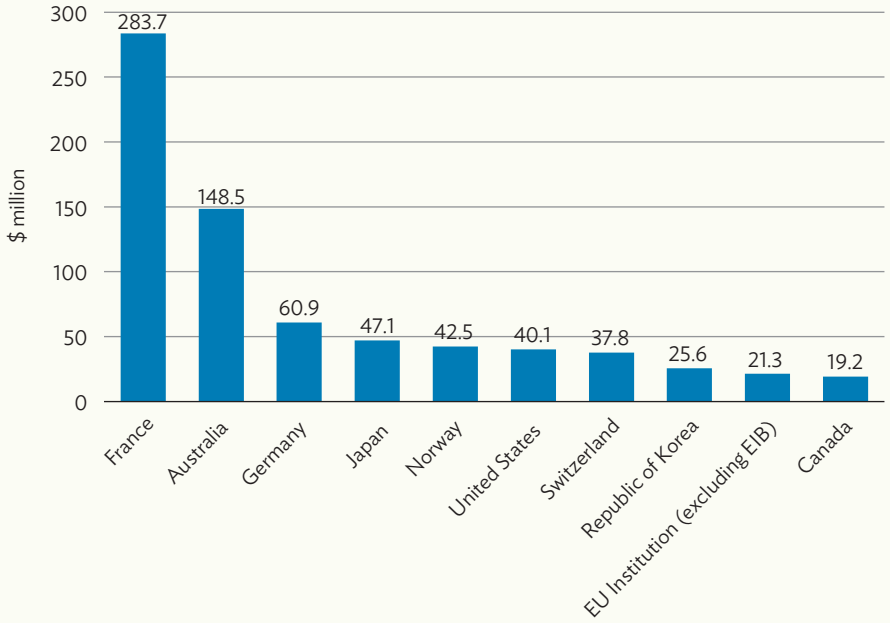
Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

1.5.4 Mitigation Financing

In terms of efforts to reduce emissions (mitigation), France provides the most financial support with $283.7 million, followed by Australia with $148.5 million, and Germany with $60.9 million, according to figure 1.12. Out of the total assistance given, 60% was in the form of grants, 39% as debt, and a small portion of 2% as equity and shares, as shown in Figure 1.13. The energy sector received the highest funding of $254.4 million, followed by general environmental protection and industry/mining sectors, both receiving $107.4 million. Agriculture secured the fourth position with $93.5 million, as seen in Figure 1.14.

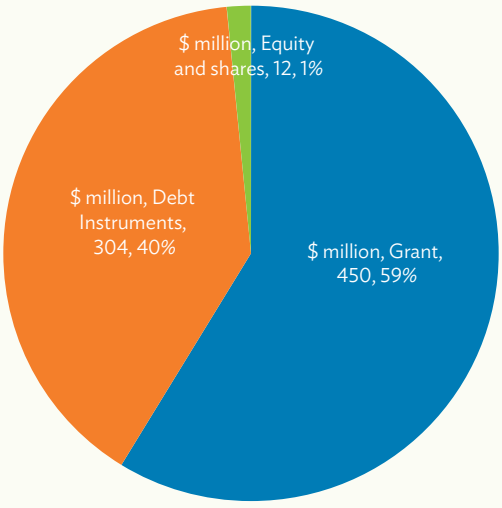
Figure 1.12: Top 10 Climate Finance Providers, 2021



EIB= European Investment Bank, EU = European Union.

Source: OECD. http://oe.cd/development-climate (accessed 23 June 2023).

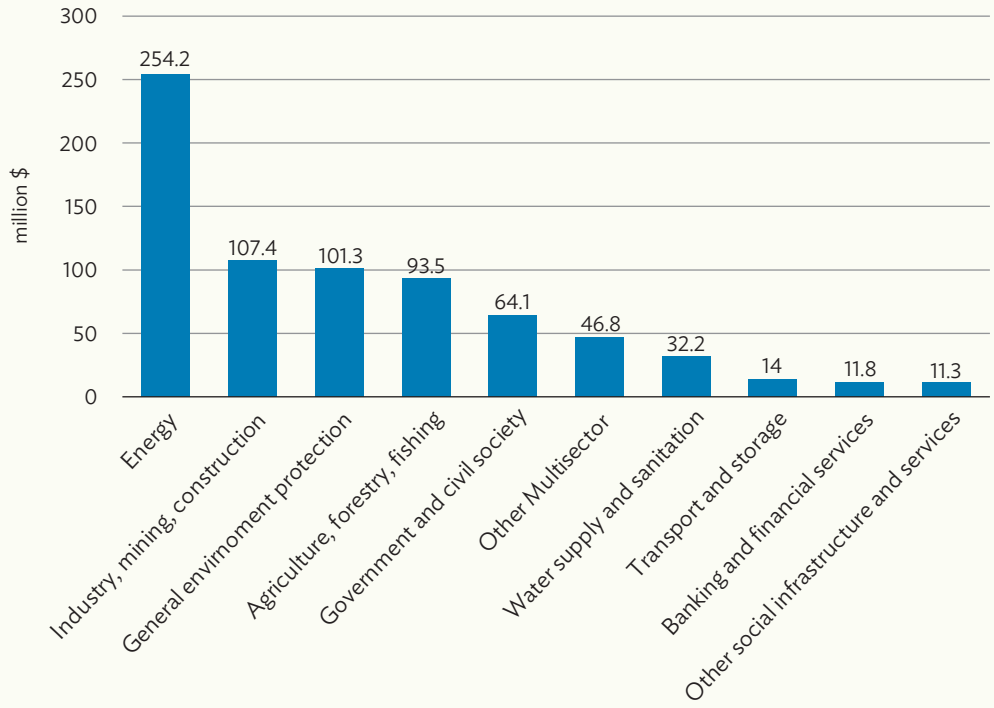
Figure 1.13: Financial Instruments, 2021



Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

Figure 1.14: Top 10 Sectors Finance Recipients, 2021



Note: Region: Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Viet Nam.

Source: OECD DAC. http://oe.cd/development-climate (accessed 23 June 2023).

1.6 Conclusion and Policy Recommendations

Southeast Asian countries, which are home to 8.58% of the world's population, are positioned critically to be affected by global climate change. This region has a large agriculture sector that contributes significantly to GHG emissions and is also affected by the climate variability caused by climate change. Hence, there is a need for a concerted effort to both mitigate GHG emissions to reduce the region's climate change burden and to adapt to climatic variability. This study has comprehensively discussed various aspects of climate change mitigation and adaptation measures in this context. The region has decisively moved toward creating an adaptation framework, and national policies have been framed keeping in consideration their climate pledges. However, adopting climate resilient practices takes time as smallholder farmers are traditionally rooted. Any change in farming practices would require an extensive network of ground-level agricultural extension officers who can continuously engage with the farmers to demonstrate the benefits of these practices.

Similarly, the ASEAN region has buoyant climate change mitigation strategies that are reflected in various projects to preserve and improve biodiversity in their countries. However, financing for mitigation and adaptation will be key for the success of these initiatives. Currently, developed countries such as France, Japan, and the European Union are the leading climate finance providers to ASEAN countries. This support should be continued, and target based for creating comprehensive plans for climate change adaptation in Southeast Asia

Some of the specific recommendations that can improve the adaptation measures and mitigate GHG gas from the agriculture sector are the following. As the ASEAN bloc is a predominantly rice growing region, the alternative wetting and drying method can be promoted to save water consumption in rice cultivation and reduce pressure on groundwater use. More research is needed to develop seed varieties that are tolerant to saline soil and need less submergence days to reduce methane emissions. The precise use of fertilizer on fields can prevent wastage and will help to contain the release of nitrogen emissions. The focus should be on the preservation of mangrove forests and afforestation to prevent natural calamities like cyclones and floods as well to reduce soil erosion and salination.

On the demand side, plant-based protein consumption should be encouraged as the alternative to animal-based protein as the latter is a source of GHG emissions. Palm oil is a significant contributor to GHG emissions, so less consumption of palm oil or the use of alternative oils can be beneficial for the ASEAN region.

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CHAPTER 2

Toward a Low-Carbon Economy in Southeast Asia: Opportunities and Obstacles for Energy Transition Mechanisms

Frederick Kliem

2.1 Introduction

Many of the currently industrializing low- and middle-income countries are at an energy crossroads. A truism, perhaps, but easily demonstrated in the case of Southeast Asia, where the next few years will determine whether the region can meet global and national emissions targets and uphold environmental standards. Most Southeast Asian economies have much of their developmental path ahead of them, and meeting the needs of their people and industries requires robust economic growth. Fortunately for Southeast Asia, the region has been experiencing sustained rapid growth, which is likely to persist for at least another decade. Because of regional industrialization and urbanization as well as a global electrification trend in general, demand for energy—and electricity in particular—is growing significantly. This increase in demand is in close step with the economic growth this energy is fueling. This trajectory, as welcome as it is from a socio-economic perspective, comes at an environmental price—not least in the form of greater greenhouse gas (GHG) emissions. A specifically noteworthy example is the continued importance of coal-fired power plants in the region. Coal is the most significant contributor to Southeast Asia's energy mix as well as the greatest single source of carbon dioxide (CO_2) and other harmful pollutants. The region also has, in fact, the youngest coal-fired power plants globally on average, and some countries are building and plugging-in new coal power plants to this day.

None of the so-called developed economies managed to reach this stage of high industrialization and socio-economic development without significant use of fossil fuels, and it is these economies that are primarily responsible for climate change and its impacts. Especially the industrialized western world is, thus, in no position to lecture developing economies on their plans for energy generation and emissions. Yet, times have changed in many respects, and indeed most Southeast Asian countries have themselves set ambitious national net-zero targets and energy transition objectives. After all, Southeast Asia—and the Indo-Pacific region at large—is particularly vulnerable to the effects of climate change. It will be impossible to meet the 2015 Paris Accord objectives without having the developing countries meet the climate targets they have agreed to in Paris and set for themselves elsewhere since. And thus, just as is the case elsewhere, an energy transition toward renewable, clean energy in Southeast Asia is imperative. For one, an energy transition enhances energy security—the uninterrupted availability at affordable costs—which is a central national interest of all states. Generating renewable energy domestically and in-region reduces dependence on imports of fossil fuels and enhances availability, reliability, and affordability if the necessary infrastructure upgrades are accomplished. Second, and at least as important, a transition to renewables is inevitable if states want to meet their emission targets.

Against this backdrop, this chapter discusses the role of multilateral finance instruments in support of this energy transition, and the Energy Transition Mechanism (ETM) of the Asian Development Bank (ADB) in particular. The economic conditions and current state of Southeast Asian energy systems make it a most suitable location for ADB to pilot its relatively new ETM as well as other green finance

instruments. That notwithstanding, this chapter will also identify a number of significant challenges for the energy transition and try to manage expectations to some extent. The necessary phasing out of coal requires at least two components, both of which will be addressed below: (1) financial instruments that enable an early retirement of existing coal power plants and (2) a strengthening of national and regional energy infrastructure to produce, absorb, and distribute greener electricity.

2.2 Economic Growth, Dirty Energy, and Emission Targets in Southeast Asia

The Association of Southeast Asian Nations (ASEAN) is the second most integrated subregion in the world—second only to the European Union (Dosch and Kliem 2023). This is particularly true for the ASEAN Economic Community (AEC)—the economic pillar of the ASEAN Community (Ishikawa 2021). The ASEAN economies individually have a history of almost constant growth, with only temporary setbacks during the Asian Financial Crisis of 1997 or in times individual national crises, such as the current civil war in Myanmar. Even during the Global Financial Crisis of 2008, ASEAN's combined GDP continued to grow and managed an annual average growth rate of around 5.7% leading up to the global COVID-19 pandemic. Despite an exceptionally challenging macroeconomic environment since then, ASEAN as a combined region has been, and is projected to remain, one of the fastest-growing global subregions (IMF 2023).

Within the ASEAN framework, economic integration progressed, especially with the ASEAN Free Trade Area (FTA) established in the 1990s and the inauguration of the AEC in 2015. Such subsequent steps of economic integration led to a gradual elimination of most tariffs both intra-ASEAN and externally with its various "Plus-1" partners, such as People's Republic of China (PRC), Republic of Korea (ROK), Japan, and more—though it bears mentioning that noteworthy non-tariff trade barriers remain in place. Southeast Asia is also a major destination for foreign direct investment (FDI) with an on-year FDI increase of 44% in 2022 (UNCTAD 2022). With 61% of ASEAN citizens under the age of 35, ASEAN has a young workforce and a fast-growing population of digital natives, navigating a remarkably innovative and well-connected region with well-educated talent and governments open to digitalization and trade liberalization—all contributing to these above-global-average gross domestic product (GDP) growth and continuously strong FDI inflows. Additionally, although PRC remains the most important regional—if not global—economy, it is losing some of its attractiveness as an investment destination. For one, the nature of capitalism in a highly globalized world precipitates regular shifts especially in labor-intensive industries that seek cheaper production sites elsewhere as manufacturing costs in PRC rise. Second, US-PRC rivalry shifts some FDI from PRC toward the ASEAN region, in particular mainland Southeast Asia. In order to reduce undue exposure to the PRC market, global corporations are looking to diversify some of their business away from PRC, where businesses face greater supply chain risks and fear the possibility of future sanctions. This is in addition to increasing government interference and unfavorable living conditions during the COVID-19 pandemic. In short, PRC is less attractive today than it once was and ASEAN economies stand to benefit from multinational corporations looking for alternative manufacturing hubs to mitigate their PRC exposure.

Harnessing this economic potential requires high levels of energy security in the region. Manufacturing industries account for one-third of combined ASEAN GDP, and that is partly where much of the growth potential lies. Adding this to the already increasing urbanization and the general electrification of the economy across all sectors, Southeast Asia's energy demand for energy—electricity in particular—is significantly increasing. By some estimates, electricity demand could more than double until 2040 (International Energy Agency 2022). At the same time, it includes many of the largest emitters of CO_2, not least resulting from burning of fossil fuels, such as coal, oil, and natural gas, for national energy

systems. Unfortunately, and corresponding with the global average, one-third of Southeast Asia's total electricity is derived from coal—the most carbon-intensive source of energy, emitting the highest amount of CO_2, aside from releasing other harmful pollutants, too. Both the process of coal mining and the final product have substantial negative ecological and health consequences, including water and air pollution as well as increased respiratory diseases and higher mortality rates in coal-heavy regions. The ASEAN region includes some of the highest total coal consumers in absolute numbers, though not per capita. In particular, Indonesia makes it into the unfortunate top-10 global consumers list, although it ought to be mentioned that global coal consumption expanded most in the West, due to higher gas prices and lower availability, with a strong increase in the United States and Europe, especially in Germany since 2021. Indonesia and Southeast Asia have seen comparatively modest increases. Nonetheless, a substantial share of regional emissions come from coal consumption for electricity generation. In fact, over the past 20 years, coal has accounted for the largest share of the growth in total energy supply in Southeast Asia with a six-fold increase since 2000 (EnerData 2022). This increase is driven, of course, by the above-mentioned continued industrial growth, which will only increase in the medium-term (EnerData 2022: 25ff). In particular, Viet Nam, Lao PDR, the Philippines, Indonesia, and Malaysia have a significant amount of coal in their energy mix—though it should be mentioned that others, too, use predominantly fossil fuels, LNG in particular, to generate electricity (ASEAN Centre for Energy 2022a).

So, while PRC, India, Japan, and others will remain the largest emitters in Asia for decades to come, much of Asia's future growth and thus its emissions will come from Southeast Asia. At the same time, all 10 ASEAN states have signed and ratified the Paris Agreement in 2015, and all but one have submitted so-called Nationally Determined Contributions (NDCs), which spell out each country's non-binding national plans, including commitments and activities, to combat climate change and reduce emissions. Eight ASEAN countries have committed to net-zero targets, while the Philippines, officially still without a net-zero pledge, has articulated a strong interest in greening its economy and addressing climate change in general under the new administration of President Ferdinand Marcos Jr. At the 2021 UN Climate Change Conference in Scotland (COP26), ASEAN member states updated their NDCs, and 4 member states (Singapore, Indonesia, Viet Nam, and Thailand) have since further tightened their emission reduction targets for 2030, and many Southeast Asian states have committed to stop building new coal plants. This view is largely shared across the region's business, political, and civil society elites, with 79.2%, according to one survey (ISEAS 2022), agreeing on the need to replace fossil fuels with greener alternatives. In sum, there is largely consensus in most ASEAN member states of a commitment to increasingly meeting the energy demands of their rapidly developing economies with renewables.

Yet, intent is not necessarily implementation, and it will continue to take great political will to move toward renewable energy solutions in the pursuit of emissions reductions. Indonesia, for example, currently works on the assumption that 34% of all new power capacity to be added by 2030 will be coming from coal (Seah et al. 2023). Indeed, although Viet Nam has increased its wind and solar capacity fourfold since 2019—at a faster rate than most European countries have (The Economist 2022b)—Viet Nam and Indonesia are placed third and fourth, respectively, among the five Asian states (together with PRC, India, and Japan) responsible for 80% of planned new coal projects and 75% of existing coal power capacity (Carbon Tracker Initiative 2021). And the use of coal does have many economic advantages: mining creates plenty of stable jobs in regions where coal can be found, to the benefit of the immediate local economy. More important is the high level of energy security (availability, accessibility, and affordability) it provides. Coal is widely available and reliable at comparatively low costs; coal power plants can operate continuously, providing a stable and consistent source of electricity. In June 2023, large-scale power cuts in Viet Nam caused not only a big embarrassment for a government that seeks global investment, but directly harmed economic output. Thousands of factories in Northern Viet Nam, including Samsung and Apple plants went without sufficient electricity supply. Although

renewable sources were not at all to blame for these power cuts, this episode has certainly alarmed foreign businesses and disappointed expectations of Viet Nam becoming an alternative production hub. More importantly here, it has reinforced the need for a high level of energy security, which, arguably coal can provide for now. The Philippines, for example, has yet to begin its energy transition. Despite rhetoric of the Marcos administration and some indeed tangible renewable energy expansion, geothermal in particular, a simultaneous expansion of coal demonstrates that the primary motivation in Manila is—understandably so—not a green energy transition but enhancing energy security. Ensuring energy security will be the crucial national interest of all ASEAN economies who want to harness their significant growth potential.

The need to assess decarbonization opportunities is evident. While it is critical to address so-called Scope 3 emissions in ASEAN—emissions throughout businesses' value chains—it is equally, perhaps even more important, to immediately address electricity generation as one of the main contributors to GHG emissions. An ASEAN climate agenda must, therefore, focus on emissions reduction by increasing the capacity and share of renewables in national energy mixes and reducing the reliance on fossil fuels. And yet, despite pro forma commitments, the reality of energy consumption and planning in Southeast Asia is generally reluctance rather than a strong push toward a green energy economy. This is mostly due to continuously high inflation and the COVID-19 economic slump with immediate economic opportunities afterward. Green measures taken thus far do not yet amount to a low-carbon energy transition. Mostly because the expansion of coal power plants has been significant in the past decade and, in fact, this expansion continues to this day. The COVID-19 crisis provided an opportunity for much of the world to reset their post-pandemic economies according to green recovery standards. The EU's recovery package, for example, was a model in this regard and corresponded well with its so-called European Green Deal—the European Commission's roadmap to transform the EU's economy into a sustainable and climate-neutral resource-conscious economy. About 30% of the EU's COVID stimulus plan (Next Generation EU) and its general multiannual budget (MFF) are earmarked for climate-related investments (European Council 2020). Although it merits mentioning once again that on the national level, EU member states are not necessarily aligned with the Green Deal and European energy transitions are all too sluggish, too. That notwithstanding, some experts have suggested a similar approach for the developing world, by which developing economies would "green" their recovery stimulus measures to achieve both at the same time: encourage economic activity and make good on climate and environmental targets (Strand and Toman 2013). While most ASEAN countries launched substantial stimulus packages, alas, the COVID-19 window of opportunity was missed and de facto deprioritized green investments during the pandemic and the immediate recovery phase (Martinus and Seah 2021, 2022).

Thus, ASEAN member states have not been able to leverage green financing opportunities to align their economic objectives with their NDCs. Evidently, the energy transition is still falling short of ambitions and much need and opportunity remains for greening ASEAN's transition toward renewables. Whether ASEAN as an organization is institutionally equipped to drive this transition in Southeast Asia is unclear and out of the scope of this chapter. However, there is plenty of room for global green finance, especially from global development banks and other institutional donors.

2.3 Accelerating the Energy Transition in Southeast Asia: The Role of ADB and Blended Green Finance

The investment required to drive the green energy transition across Southeast Asia is substantial. ADB estimates that several hundred billion dollars must be invested annually (ADB 2021), while the International Renewable Energy Agency (2022) puts the price tag at up to US$5.2 trillion in investment until 2050, to reach renewable energy targets across ASEAN. The lion's share of this will

need to go to the power sector to enhance production capacity, grids, and storage systems. The level of green investments into ASEAN is growing rapidly, but it is far from adequate. A DBS Bank study (2017) estimated that the annual flows of green finance in ASEAN are, in fact, less than a quarter of the actual annual need of over $200 billion. Addressing such investment gaps are a formidable challenge. Individual ASEAN governments and the local private sector cannot or will not mobilize either such vast capital or the technical capacity to meaningfully use it (Seah et al. 2023). While public finances are inadequate, a lack of commercially attractive projects prevent private capital flows. Hence, the survey cited above also finds that ASEAN respondents from the business and political community as well as from civil society organizations believe that insufficient financial resources (50.9%) and a lack of research and development, technology, and expertise (50.4%) are the two greatest hurdles to decarbonizing Southeast Asia (ISEAS 2022). Even though individual governments may find themselves unable to finance their energy transition alone, the economic and financial consequences of inaction are dreadful, as climate change comes with its own costs, of course. The Indo-Pacific region is among the most vulnerable with regard to the impact of climate change, Southeast Asia in particular with increasing floods, typhoons, and rising sea levels (The Economist 2022a). In addition to the many lives and livelihoods lost, Swiss RE estimates that in the most severe scenario of global warming, ASEAN economies would lose about 37% of their total GDP by 2048. The most vulnerable ASEAN member states Indonesia, Malaysia, the Philippines, Singapore, and Thailand, could lose an economic output of more than 7 times their GDP by 2050 (Swiss RE 2021). This is equally true for Viet Nam with its long coastline, the critically important Mekong River Delta, and low-lying major cities. Indeed, climate change already disrupts economic activity in Viet Nam. The World Bank calculates that the country already lost $10 billion in 2020, 3.2% of GDP, to climate change impacts, estimated to increase to up to 14.5% per year by 2050 (World Bank 2022). Further, green investments ought not to be regarded as capital-intensive investments with unclear returns. In fact, a transition done right can generate profits for private companies and benefits the local economy, too. Numerous studies demonstrate that green investments aid the local economy by, inter alia, creating 1.2–1.5 times more jobs in the medium term than investments in fossil fuels (Jaeger et al. 2021). A similar scenario is true for secondary green infrastructure investments that accompany primary activities, such as upgrades to existing power grids, building storage capacity, etc. Moreover, renewable energy sources are increasingly cost competitive in comparison with fossil fuels, and this trend is manifesting as generation, storage, and transmission technology becomes more sophisticated and widely available. Renewables are also the indigenous answer to the increasing interest in becoming energy independent, less reliant on imports of fossil fuels.

There is, thus, a need for ASEAN's dialogue partners and international organizations to facilitate transformative change across Southeast Asia's energy systems. For example, there is an evident role for the EU, which has made climate change mitigation and green economic pathways a primary policy objective across Europe and the developing world. As part the European Green Deal, cooperation with ASEAN member states and financing green energy projects are fundamental to a transformative energy transition across ASEAN. The EU can help by directly providing grants and loans and mobilizing private investments. It also actively supports multilateral green finance mechanisms, such as the ASEAN Catalytic Green Finance Facility (ACGF)—a mechanism launched by ASEAN Infrastructure Fund (AIF) and managed by ADB, a trusted partner in Southeast Asia. The role of public finance and green finance instruments is to lay the groundwork and mobilize private investors. ACGF seeks to multiply investments in green infrastructure in Southeast Asia with both loans and technical assistance from co-financing partners such as the EU, which has heavily invested in ACGF. The mechanism follows the most promising financing model to date, which seeks to cover upfront costs and investment needs with public funds in the form of sovereign loans, provide technical assistance to governments to identify and rollout commercially viable green infrastructure projects with the eventual hope to attract private investments. Without this private capital, the large gaps cannot be filled.

Such investments should, as a first priority, go toward enhancing the region's capacity to produce and distribute renewable energy, green infrastructure, in other words. There is an urgent need for green financing to prioritize closing the carbon emission gap of up to 3.2 gigatonnes by 2030 in order to meet emissions targets. Indonesia will require the lion's share, alongside Thailand and Viet Nam in second and third place, respectively. As discussed, much of this will have to come from international donors, especially multilateral organizations such as the EU, and development banks such as ADB and others. Especially during the global pandemic and the post-COVID-19 recovery phase, various multilateral donor institutions assisted low- and middle-income ASEAN countries, including ADB, World Bank (WB), Asian Infrastructure Development Bank (AIIB), and International Monetary Fund (IMF). More than half of the assistance—disbursed in the form of both loans and grants—was green finance. To date, the two largest recipients in Southeast Asia are Indonesia and the Philippines, both being on a strong growth trajectory as well as having governments interested in energy transition (Martinus and Seah 2021).

More than any other stakeholder, ADB is well placed to be the transformative agent in Southeast Asia's energy transition. A tried and tested, trusted partner in Asia, ADB is transparent, proactive, and works in close cooperation with and is supported by the US, Japan, PRC, India, the EU and many other international donors. ADB's multi-stakeholder approach has been effective for many decades and accumulated great expertise in infrastructure investments in Asia since its founding in 1966. Specifically, ADB provides loans and grants to member economies for development projects, as well as technical expertise and policy advice for planning and implementation of these projects. While its primary objective is poverty reduction and the improvement of human living conditions in general, it has adapted its specific approaches and focus areas over time. Climate change mitigation and adaptation has become a main area of ADB's work in the region. Its main instruments are the provision of financial and technical assistance to support sustainable development projects in various sectors, including energy systems. In the lead up to the 2015 United Nations Climate Change Conference, or COP21, in Paris, ADB committed to greening its financing approach and has financially increased this commitment gradually ever since. Since then, combatting climate change has become an integral consideration in the bank's financing strategy. Since May 2021, ADB no longer participates in investment projects that seek to build new or extend the life of existing coal-fired power plants. In 2022, ADB itself committed $7.1 million to climate change mitigation and adaptation, while mobilizing $387 million from external sources.

Zooming in specifically, ETM serves to demonstrate both the creativity and the determination of multilateral green finance. ETM is an innovative instrument, which seeks to leverage a

> "market-based approach to accelerate the transition from fossil fuels to clean energy. Public and private investments—from governments, multilateral banks, private sector investors, philanthropies, and long-term investors—will finance country-specific ETM funds to retire coal power assets on an earlier schedule than if they remained with their current owners." (ADB 2022)

In other words, ETM uses precisely the blended capital structure described above. Its objective is to finance an early retirement of otherwise still long-running, young coal power plants and to develop green energy alternatives instead. It comprises of 2 separate but complementary pillars: (i) the Carbon Reduction Facility (CRF) and (ii) the Clean Energy Facility (CEF). The former will provide the capital to retire comparatively young coal power plants. After a consortium of capital providers have acquired this physical asset, the plant will be taken off grid earlier than its actual life cycle would suggest. The current utility asset owners—more often than not state-owned energy companies—transfer their assets toward the CRF and are expected to use the capital return for green investments in accordance with

the state's energy transition plans. The CEF will invest in foundations to make a massive expansion of renewable alternatives an attractive investment for energy companies and other investors. Southeast Asia has the world's youngest coal power plants and plenty of them, with an average age of roughly 12 years (ASEAN Centre for Energy 2022b). These plants would, in a business-as-usual scenario, operate for several decades yet, and closing them early would result in a severe asset loss for plant owners and investors. Moreover, shutdowns of coal power plants do require immediate investments in realistic and scalable alternatives.

The case for phasing out coal in Southeast Asia—and globally—is self-evident: ASEAN member states will not be able to meet their climate commitments without it. But it is also aligned with local needs and commitments. Elite opinion across ASEAN is predominantly in favor (62.4%) of an immediate stop to building new coal-fired power plants (ISEAS 2022). At COP26 in Scotland, 5 ASEAN member states (Brunei Darussalam, Indonesia, the Philippines, Singapore, and Viet Nam) signed on to the British-led Global Coal to Clean Power Transition Statement. This commits the contracting parties to end investment in new coal power plants and phase out all coal power over the course of the 2030s for industrialized economies and 2040s for the rest of the world (UN News 2021). These commitments cover the majority of ASEAN's coal emissions. Coal retirement while expanding renewables is the most important step toward meeting the emissions pledges; this (coal retirement) initiative is likely to go a long way toward achieving the goal of emissions reduction. ETM could realistically retire up to about half of the existing coal-fired power plants in Southeast Asia and would, thus, directly support national energy transitions by scaling the demand for renewable alternatives—more than a minor footnote is the jobs this renewable rollout would create. ADB is currently studying the feasibility of ETM by piloting it in the largest ASEAN countries, namely, Indonesia, the Philippines, and Viet Nam, where coal contributes half or more to the energy mix and who are the first-, second-, and fourth-largest CO_2 emitters in ASEAN. The initial objective of ETM is to reduce coal usage by 50%, roughly 200 million tons of CO_2 per year, in Southeast Asia (ADB 2022). But ADB is keen to prove that coal plant buyouts are a workable strategy and ultimately a good investment, too. It believes that once this approach is tested and proven, it will be scalable beyond this pilot phase and applicable to other countries in Southeast Asia and globally.

2.4 Challenges and Opportunities Along the Way

There is great potential in an approach of blended green finance, combining public funds with private investment as well as philanthropic sponsorship. One universal ASEAN working group rather than several separate oversight bodies for each project, set up by the main funding organization or consortium, can probably best implement this approach. This ASEAN working group could work together with these multilateral funders, such as ADB and the EU, who would retain administerial oversight, but would be guided by specific national needs and opportunities. Such a structure would best mix external funding and technical expertise with local buy-in and implementation. The recipient state would commit to a clear and ambitious path toward decarbonizing its power generation, including a pathway toward an ambitious net-zero target, as well as a commitment to transition away from fossil fuel usage in a reasonable time frame. There would also be jointly agreed standards for scaling renewable alternatives in order to ensure both low-carbon energy security and a just, ecologically sustainable, and ultimately commercially viable energy transition.

The greatest long-term renewable potential lies in solar, wind, geothermal, and some degree of hydropower, depending on local conditions across ASEAN. Ideally, these sources could feed an integrated regional grid and trade across ASEAN. Of course, the region and the world are far off from such an ideal scenario. Nonetheless, there is much room to harness the wind and solar potential in Southeast Asia. The energy supplied by modern renewable forms of energy has more than doubled between 2000 and

2020 as renewable sources expanded rapidly. Solar and wind technology has experienced astounding progress amid stark cost declines and both are promising alternatives in Southeast Asia, with both wind and sunlight in abundance.

For now, however, there are at least 2 serious problems that need to be overcome: (i) alternative energy sources are not yet sufficiently developed, and those that are, are not necessarily the most viable and/or sustainable options; and (ii) even in an ideal renewable generation scenario, using the electricity derived from these sources requires a capable ASEAN grid, which currently does not exist.

Geothermal and hydropower are a large share of renewable energy across ASEAN, though less discussed than solar PV and wind. Geothermal resources are mainly located in Indonesia and the Philippines; Cambodia, Lao PDR, Viet Nam, and Myanmar continue to develop hydropower capacity, taking advantage of their hilly terrains and high levels of precipitation (International Energy Agency 2022). Geothermal energy is a well-researched technology, employed around the world, that can operate at high capacity. While both a renewable and ecologically sustainable resource, it is difficult to extract. This is especially so in less geothermal regions across ASEAN, where high-pressure streams of water would have to be injected deep into the Earth, often resulting in minor seismic activity and small earthquakes. Nonetheless, especially the Philippines and Indonesia with their natural volcanic earth are highly suitable extraction grounds for geothermal energy. They are second and third, respectively, only to the United States in terms of installed geothermal capacity. Installation is, however, rather costly. The Philippines, for example, generates over 20% of its national electricity from geothermal energy, but relies mostly on investments from the United States, by far the largest user and proponent of geothermal energy usage worldwide. Moreover, experience suggests that geothermal energy is better suited to provide heat to industrial installations rather than nation-wide electricity for consumers. While geothermal can be a crucial component of an overall energy system, it is not (yet) sufficiently suited as a great source of electricity for these reasons.

Hydropower, on the other hand, is an excellent source of electricity in theory, and currently predominantly deployed in mainland Southeast Asia. However, while comparatively very low in greenhouse emissions, most hydropower generation plants in Southeast Asia are neither eco-friendly nor acceptable socio-economically (Montecarlos 2021; Eyler 2019). Lao PDR, for example, has installed large and ever-increasing hydropower capacity. The plan is to both support domestic demand and to become "the battery of Southeast Asia." The latter objective is an ambitious plan for electricity exports across the region. For now, large parts of the country's export go to Thailand, but they have also begun feeding a more regional electricity grid with supplies extending as far as Malaysia and Singapore. While this is laudable, countries such as Lao PDR need much greater support with creating ecological and social standards. This is not the space to discuss in detail the downsides of hydropower in mainland Southeast Asia. Suffice it to say they are considerable, including forceful relocation of river-dwelling communities and all but destroying the unique ecosystem of the Mekong River, a crucial lifeline to life in mainland Southeast Asia (ibid.). In sum, while there is some room for both geothermal and hydropower in Southeast Asia's energy mix, the phasing out of coal must be accompanied by a very significant expansion of solar and wind capacity. How this can be done is already subject of numerous discussions in other papers (Edianto Lee 2022). A further, much less frequently discussed issue is the significant capacity gap in Southeast Asia's grid infrastructure.

2.5 An ASEAN Electricity Grid

Naturally, power grids are crucial. The intermittency of renewables such as wind and solar are a challenge for electricity grids often designed in the past for the steady supply by fossil fuel plants that can be switched on and off at will and thus regulate the balance between supply and demand. These challenges can be overcome, but this is a complex operation that requires numerous policies. Consumers

need to be incentivized to align their demand with the predictable intermittency of renewable supply. More importantly, the quality of the regional grid in Southeast Asia is such that it presents the greatest hurdle to a large-scale deployment of renewable sources. A more robust transmission network can handle the ebbs and flows better than currently possible, when renewables, especially wind and solar, have to be taken off grid sometimes and go to waste due to the inability of the transmission system to handle them. Viet Nam, for instance, as a regional leader in solar and wind energy has at times struggled with this, underlining the challenge of underdeveloped power grids. Similar issues are relevant regarding the uneven access to power in urban and rural areas in Southeast Asia, especially in the archipelagic states Indonesia and the Philippines. Grid strengthening should also include a two-way transmission capability to decentralize production. Electricity can then be directed not only from power stations to end-consumers but also vice versa, with consumers installing renewable power generating capacity, such as smaller solar panels, to feed some excess electricity back into the system. The necessary upgrades will be very costly, with estimates north of $1.0 trillion (The ASEAN Post 2019) to modernize it. As with the coal retirement approach, this will require a blended financing model, with governments and international donors investing to unlock private capital.

A further milestone is trans-boundary, intra-ASEAN power sharing. The so-called ASEAN Power Grid is an initiative that seeks pan-regional electricity connectivity by both building the necessary infrastructure and establishing a trans-boundary electricity market for intra-ASEAN power trade. It is being established on a bilateral basis first before being expanded to an eventually fully integrated ASEAN Power Grid. A harmonized bilateral model, including standardized bilateral agreements, on wheeling charges, for instance, is being overseen by a regional oversight body. This model can allow individual ASEAN members to trade with others, even if they do not share a border. On that intermediary basis, a regional power market can eventually be developed. Singapore has been at the forefront of developing the regional grid and is partaking in the first few bi- and multilateral ASEAN Power Grid projects, including the recently made operational Lao PDR-Thailand-Malaysia-Singapore project, which delivers hydropower electricity from Lao PDR to the city-state (Singapore Energy Market Authority 2022). There has already been significant progress and several meaningful projects, but much work needs to be done in the regulatory and technological space (Aris and Nørregaard Jørgensen 2020). A multilateral trading system can harness economies of scale, thereby making the project commercially more attractive. It can also give underperforming economies a chance to generate GDP. Lao PDR, for example, is aiming to be a major supplier of renewable energy in the region. It has already exported more than 6GW of cross-border electricity to ASEAN members including Cambodia, Myanmar, Thailand, and Viet Nam. On the one hand, trans-boundary electricity trade can help meet rising demand as ASEAN economies grow and can enhance access in more remote locations. On the other hand, an updated grid can absorb much greater renewable supply, thus reducing the need for fossil fuels.

In sum, while there is a need to phase out coal, the potential solution must at least also include the aggressive roll out of renewables and improve grid infrastructure. For that, a region-wide ASEAN grid must be expanded and upgraded. Improving this will be extremely costly, needing institutional funding and private investment in both expanding an integrated, regional grid infrastructure and the capacity to absorb and distribute from locations in ASEAN that have the greatest renewable potential. As great as ETM is, similarly powerful and creative financial instruments must promote pan-ASEAN connectivity through the ASEAN Power Grid.

2.6 Conclusion

Southeast Asia must harness its economic growth potential in order to live up to many of the countries' own objectives and even the UN's Sustainable Development Goals, especially lifting people out of poverty. Ensuring energy security is, and will remain, ASEAN governments' national priority.

Nevertheless, addressing the region's—and the world's—persistent reliance on coal must be the main priority in order to meet regional and global climate targets and mitigate the already palpable changing climate. Energy demand is increasing rapidly as the regional economies are growing. Despite all the pledges, this is increasingly met with dirty coal. Governments must safeguard the immense growth rates of the past and seek to harness the immense economic opportunities of the present—while trying to phase out coal to meet climate targets. In other words, ASEAN member states need to massively accelerate renewables, wind and solar in particular—fast and steadily. For now, it is not evident that governments have a clear and realistic strategy, as gaps remain in the region's emission reduction plans and the pathways to decarbonization are unclear.

No ASEAN state can solve this dilemma alone, and aiding the region's energy transition is, thus, imperative for all states and organizations that have put combatting climate change high on their agenda. National environmental and broader sustainability objectives have not been translated into coherent financial policy frameworks. There is, therefore, an evident need for both institutional and private investment in projects that can drive this energy transition. International green finance has a key role to play in catalyzing private funds, especially for projects at early stages of development. Organizations of multilateral finance and mechanisms such as ETM are very useful instruments. The EU and others are, too. Trust, expertise. and financial prowess are the key ingredients.

Many challenges remain. This chapter has only had space to briefly address a few of these, such as the lack of renewable alternatives and an underperforming grid infrastructure. As ASEAN states work toward decarbonizing their economic activity, they must ensure that their power grids can account for the increased renewable capacity. This does come at a high cost. Hence, while ETM is very worthwhile initiative, it is not the "be all and end all" of Southeast Asia's energy transition. Equally important as phasing out coal from the energy mix is investing even more green capital than ETM can into the capacity of renewables generation and transmission. Multilateral cooperation can be fruitful, and is desirable to create trends and narratives, and get the process started. Progress in one or two countries or regions can drive similar developments in others. It is, thus, advisable for international donors to cooperate and coordinate their initiatives to increase investment and create synergies among individual projects. In particular, ADB-EU cooperation could provide substantial funding and unlock private investments from both Asia and Europe to support the development and implementation of green renewable energy sources and transmission systems in ASEAN. In addition to expanding the JETP network, Brussels could also use some potential revenue from CBAM (Carbon Border Adjustment Mechanism) into adaptation and mitigation projects in developing ASEAN countries. This approach would acknowledge trade dependencies and help share the burden of climate finance, fostering collective security and economic benefits. In terms of knowledge sharing, there is much value in sharing European expertise and technologies related to green energy solutions with ASEAN countries. This could involve collaborative research projects, technology transfers, and knowledge-sharing initiatives aimed at accelerating the adoption of sustainable energy technologies and practices. However, proof is in implementation, and given the scale of the challenge, this can also only be the beginning.

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CHAPTER 3

Low-Carbon Energy Transition Toward Carbon Neutrality for ASEAN

Shigeru Kimura

3.1 Introduction

After the 2021 United Nations Climate Change Conference (COP26) in Glasgow, many countries—including the Association of Southeast Asian Nations (ASEAN) Member States (AMS)—announced their commitment to achieve carbon neutrality by 2050 or 2060. However, this will not be easy for AMS because (i) ASEAN will need to achieve continuous economic growth to catch up with the Organisation for Economic Co-operation and Development (OECD) countries and (ii) ASEAN has been dependent on fossil fuels, and its coal and gas power plants are relatively new (less than 10 years old). In addition, many AMS have not yet published official carbon-neutral pathways toward 2050 or 2060. Thus, using the East Asia Summit (EAS) Energy Outlook models, which apply an econometric approach, this chapter (i) forecasts a carbon-neutral pathway for each AMS; (ii) analyzes the additional costs to become carbon neutral by 2050; and (iii) offers policy recommendations based on the results of the energy outlook models.

3.2 Carbon-Neutral Pathways

How can carbon neutrality be achieved? Theoretically, it involves 2 aspects: (i) decarbonization of the final energy consumption sector, which consists of the industrial, transport, residential, and commercial sectors; and (ii) decarbonization of the transformation sector, especially power generation. In the final energy consumption sector, the promotion of energy efficiency and conservation is significant, followed by electrification across the sectors, which refers to the shift from fossil fuels to electricity, e.g., internal combustion engine vehicles to battery electric vehicles (BEVs). In the power generation sector, a reduction in fossil fuel power generation and an increase in zero emission power sources (e.g., renewable electricity) are essential. In addition, the application of carbon capture and storage (CCS) for fossil fuel power plants and hydrogen or ammonia power generation are important considerations for AMS. Finally, the remaining carbon dioxide (CO_2) emissions from fossil fuel combustion are offset by forest absorption of CO_2, which is called negative emissions.

3.3 East Asia Summit Energy Outlook

3.3.1 Basic Concept

The EAS Energy Outlook covers the 10 AMS plus 7 countries in the region—Australia, the People's Republic of China (PRC), India, Japan, the Republic of Korea (ROK), New Zealand, and the United States. It was initiated in 2008 to analyze the energy saving potential and CO_2 emission mitigation efforts of the 17 EAS countries, under the business as usual (BAU) and alternative policy scenario (APS), in terms of total primary energy supply (TPES) and CO_2 emissions. The APS reflects the aggressive energy efficiency and conservation (EEC) and renewable energy targets of the EAS 17 countries. Using APS targets, the Economic Research Institute for ASEAN and East Asia (ERIA) has updated this outlook periodically. In 2021–2022, ERIA produced an additional scenario—the Low-Carbon Energy Transition: Carbon Neutral (LCET-CN) scenario—which would achieve carbon neutrality around 2050–2060. This chapter presents the results of the LCET-CN scenario, focusing on ASEAN.

3.3.2 Model Assumptions

This energy outlook applies an econometrics approach, which means that energy consumption is induced by economic activities in the industrial, transport, residential, and commercial sectors. The following assumptions are considered:

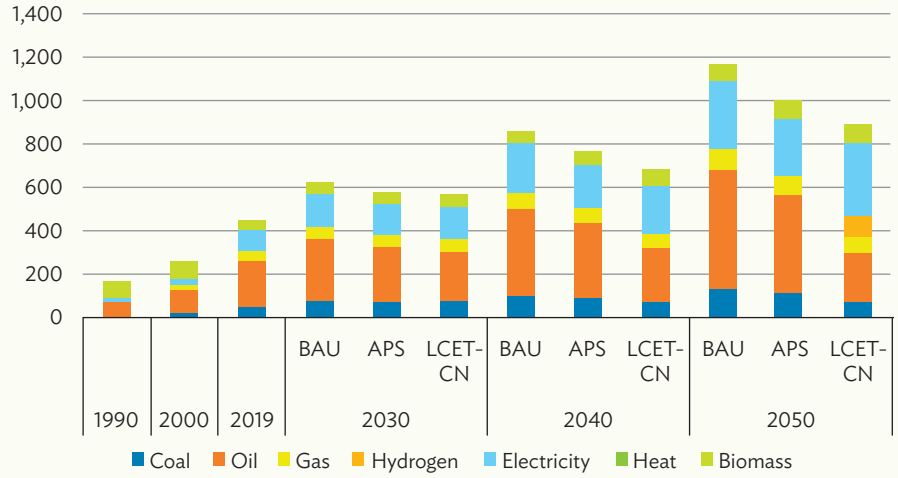
(i) Economic growth of 4.1% per year throughout ASEAN during 2019–2050
(ii) Population growth of 0.8% per year throughout ASEAN during 2019–2050
(iii) Power capacity by source, according to the respective power development plans of each AMS during 2019–2050
(iv) Crude oil price of $100 per barrel in 2050 (2019 prices)

3.3.3 Model Results

Final Energy Consumption

The total final energy consumption (TFEC) in the industrial, transport, residential, commercial, and other sectors (e.g., agriculture) will likely increase by 3.1% per year during 2019–2050 because of the stable economic growth assumption under the BAU scenario. The TFEC growth rate under the alternative policy scenario (APS) will be lower than under the BAU scenario, at 2.6% per year during the same period, because of the promotion of EEC. The TFEC under the LCET-CN will likely increase by 2.2% per year because of more aggressive EEC and electrification across the sectors (Figure 3.1). Electricity has the highest growth rate of the energy types among the 3 scenarios (4.2% per year under the LCET-CN scenario, compared with the BAU scenario and the APS), followed by oil in the case of the BAU scenario and the APS. The LCET-CN scenario will realize the shift from internal combustion engine vehicles to BEVs in the road transport sector, so its petroleum consumption will not grow significantly—increasing by only 8% from 2019 to 2050. Biomass consumption will register the lowest increase in the case of the BAU scenario and the APS, but will rise by 2.2% per year under the LCET-CN scenario, especially for heating boilers in the industrial sector and grill use in the commercial sector. Coal and gas consumption will increase continuously, but their shares will be lower than the share of oil in the case of the BAU scenario and the APS, while the LCET-CN scenario will begin to consume hydrogen after 2040, reaching a share of more than 10% in 2050. As a result, fossil fuels will comprise about 65% under the BAU scenario and the APS in 2050, but only 40% under the LCET-CN scenario, with the remaining 60% coming from electricity, hydrogen, and biomass (Figure 3.2). Since EEC policy contributes to energy savings, the APS will reduce energy consumption by 15% compared with the BAU scenario in 2050. Energy saving under the LCET-CN scenario will be bigger than the APS at 24% compared with the BAU scenario by 2050. Thus, EEC is a key policy measure for achieving carbon neutrality by 2050–2070.

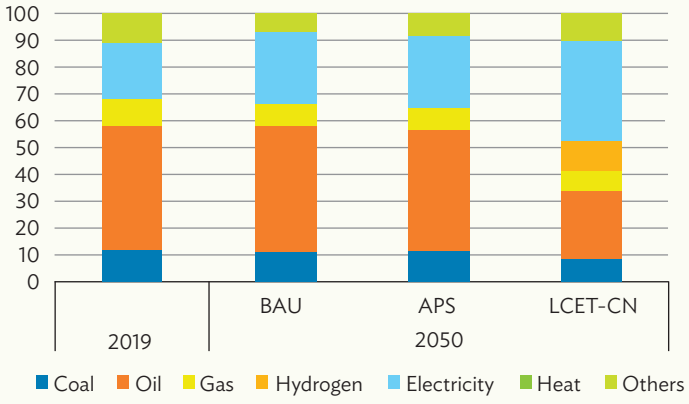
Figure 3.1: Final Energy Consumption by Scenario, 1990–2050 (Mtoe)



APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, Mtoe = million tons of oil equivalent.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Figure 3.2: Share of Energy Type by Scenario, 2019 and 2050 (%)



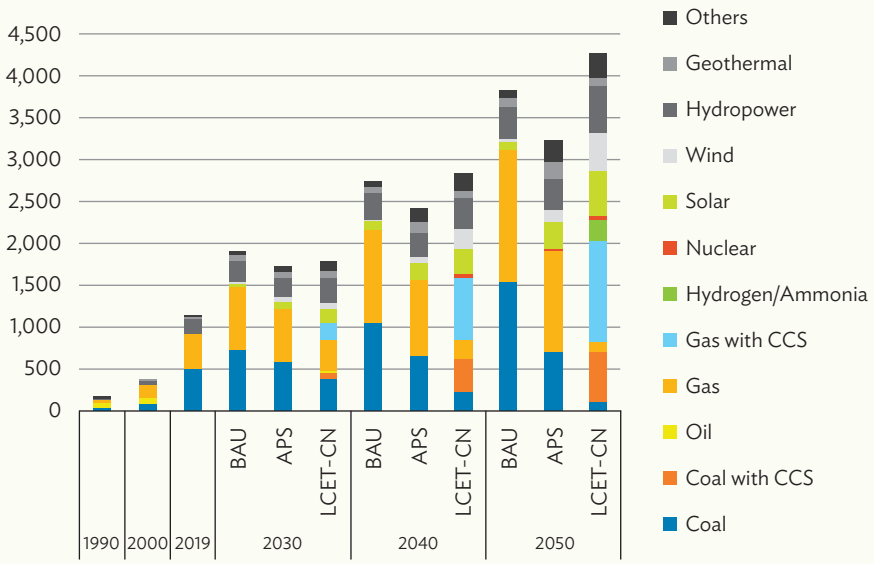
APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Power Generation

To meet the significant increase in electricity demand until 2050, power generation under the BAU scenario will grow by 4.0% per year during 2019–2050, while the share of thermal power generation (coal and gas power generation) will be about 80% by 2050. On the other hand, power generation under the APS will increase by 3.4% per year because of EEC of electricity consumption, while its share of thermal power generation will decline to 60% by 2050 because of an increase in renewable electricity (e.g., solar and hydro). However, power generation under the LCET-CN scenario will grow by 4.4% per year because of electrification, but its share of thermal power generation without abatement will be just 5.5% in 2050. The share of thermal power generation with CCS in 2050 will be dominant at 42%, followed by variable renewable energy at 23%, traditional renewable energy at 22%, and hydrogen and ammonia power generation at 5.9%. ASEAN will increase variable renewables (e.g., solar and wind) as well as traditional renewables (i.e., hydro, geothermal, and biomass). On the other hand, ASEAN will continue to use thermal power generation until 2050, but will apply CCS to coal and gas power plants after 2040 to reduce CO_2 emissions (Figures 3.3 and 3.4).

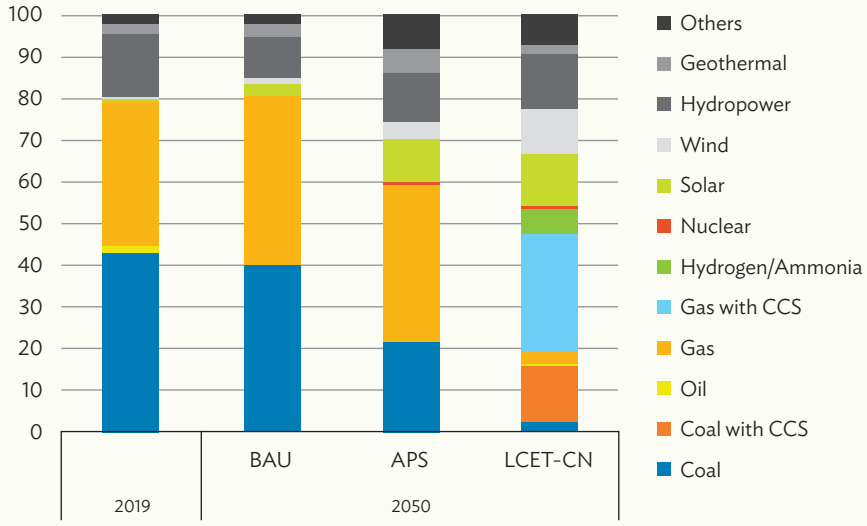
Figure 3.3: Power Generation Mix by Scenario, 1990–2050 (TWh)



APS = alternative policy scenario, BAU = business as usual, CCS = carbon capture and storage, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, TWh = terawatt-hour.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Figure 3.4: Power Generation Mix by Scenario, 2019 and 2050 (%)



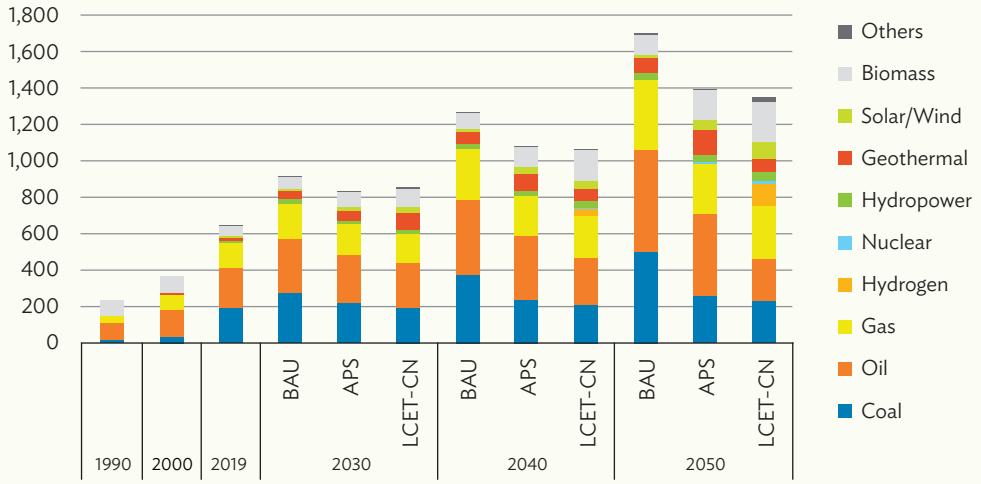
APS = alternative policy scenario, BAU = business as usual, CCS = carbon capture and storage, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Primary Energy Supply

The total primary energy supply (TPES) of the BAU scenario will increase by 3.1% per year during 2019–2050, while the BAU scenario will continue to depend on fossil fuels whose share in 2050 will be the same as in 2019 (85%). The TPES of the APS will increase by 2.5% per year, while its fossil fuel share in 2050 will be 71%—lower than under the BAU scenario—because of the promotion of EEC and the deployment of renewable energy. The LCET-CN scenario will increase by 2.4% per year and is similar to the APS but with a different energy mix. Its fossil fuel share will decline to 56% in 2050, while the share of renewable energy will increase to 33% and the shares of hydrogen/ammonia and nuclear energy will be 10%. About 90% of fossil fuels under the LCET-CN scenario will be treated by CCS by 2050, as mentioned in subsection (3.2) above (Figures 3.5 and 3.6).

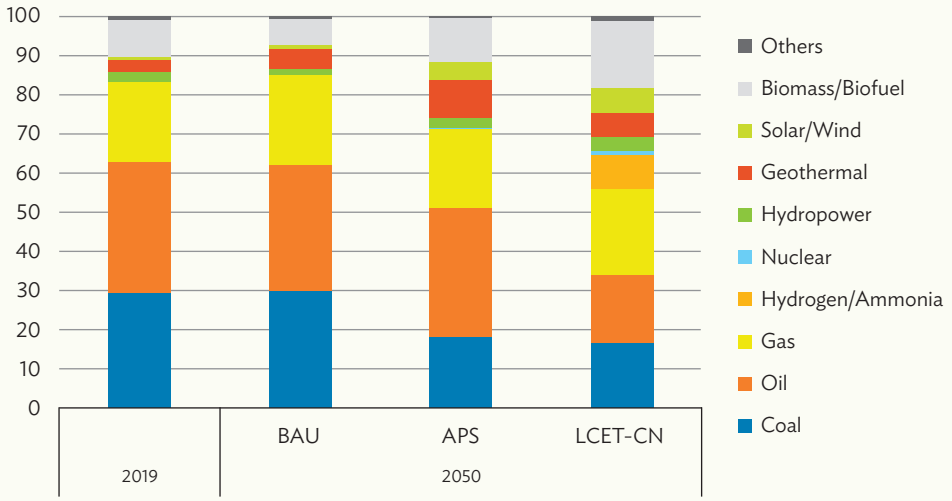
Figure 3.5: Total Primary Energy Supply by Scenario, 1990–2050 (Mtoe)



APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, Mtoe = million tons of oil equivalent.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Figure 3.6: Energy Mix of Total Primary Energy Supply by Scenario, 2019 and 2050 (%)



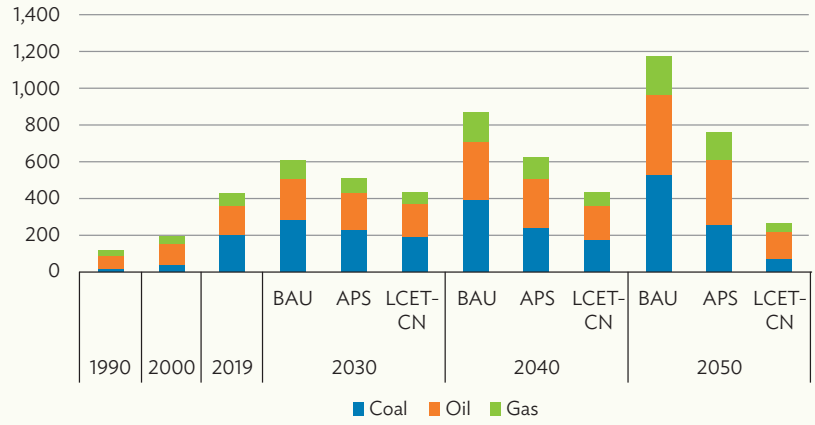
APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Carbon Dioxide Emissions

CO_2 emissions will increase by 3.3% under the BAU scenario and 1.9% under the APS during 2019–2050 because of the dependence on fossil fuels. On the other hand, CO_2 emissions under the LCET-CN scenario will decrease after 2040 because of the deployment of CCS and the expansion of hydrogen and ammonia. CO_2 emissions under the LCET-CN scenario will be 264 million tons of carbon in 2050, which is much lower than the level in 2019 (424 million). The pathway of CO_2 emissions until 2050 shows that ASEAN will be able to keep CO_2 emissions almost at the 2019 level until 2040 because of the increase in renewable energy; from 2040 to 2050, ASEAN will reduce CO_2 emissions dramatically by applying CCS and increasing the share of hydrogen and ammonia (Figures 3.7 and 3.8).

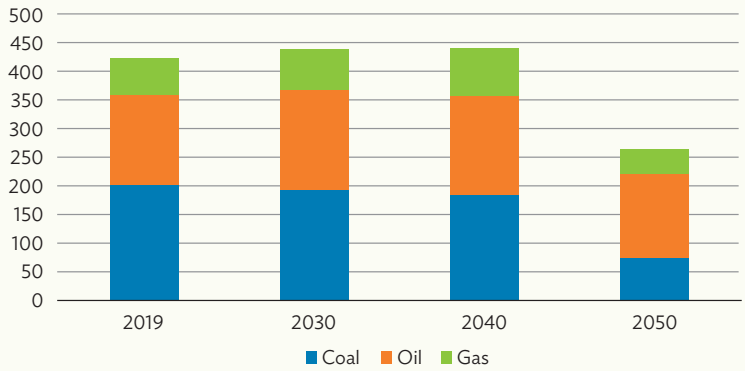
Figure 3.7: Carbon Dioxide Emissions by Scenario, 1990–2050 (Mt-C)



APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, Mt-C = million tons of carbon.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Figure 3.8: Historical Carbon Dioxide Emissions under the Low-Carbon Energy Transition: Carbon-Neutral Scenario, 2019–2050 (Mt-C)



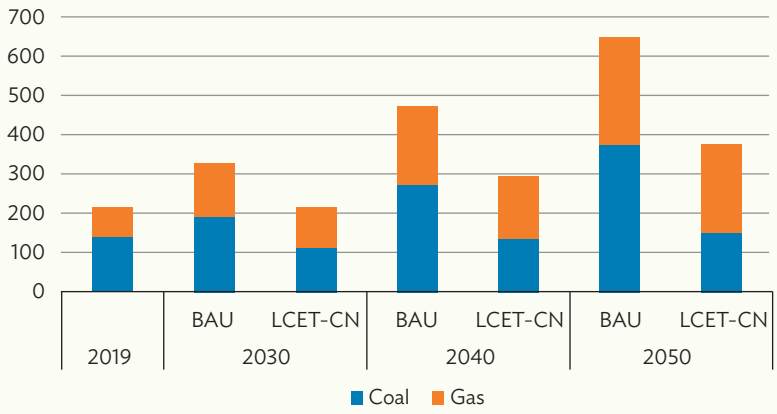
APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, Mt-C = million tons of carbon.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023

Coal-to-Gas Transition

The LCET-CN scenario reflects the coal-to-gas policy in the power generation sector. Because of the rapid shift to renewable energy under the LCET-CN scenario, thermal power generation will be lower than under the BAU scenario. However, gas input will be higher than coal input in power generation compared with the BAU scenario. Thus, the coal-to-gas policy is very important to mitigate CO_2 emissions, especially during the energy transition (Figure 3.9).

Figure 3.9: Fuel Input in the Power Generation Sector, 2019–2050 (Mtoe)



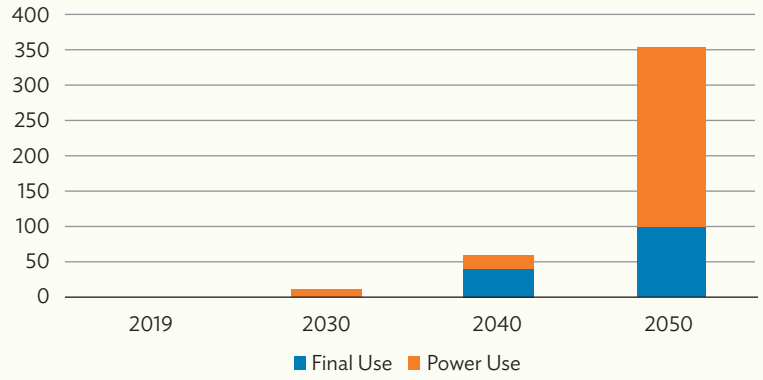
APS = alternative policy scenario, BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon Neutral, Mtoe = million tons of oil equivalent.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han, August 2023).

Hydrogen Usage

Hydrogen is combusted without CO_2 emissions, so hydrogen will substitute fossil fuels across the sectors. In ASEAN, hydrogen will be used for industrial activities (e.g., heating boilers and furnaces) and road transport, but just for heavy-duty vehicles (e.g., intercity buses and trucks). ASEAN will start to consume hydrogen after 2030 and power use will be dominant compared with the final sector (Figure 3.10).

Figure 3.10: Hydrogen Usage under the Low-Carbon Energy Transition: Carbon-Neutral Scenario, 2019–2050
(Mtoe)



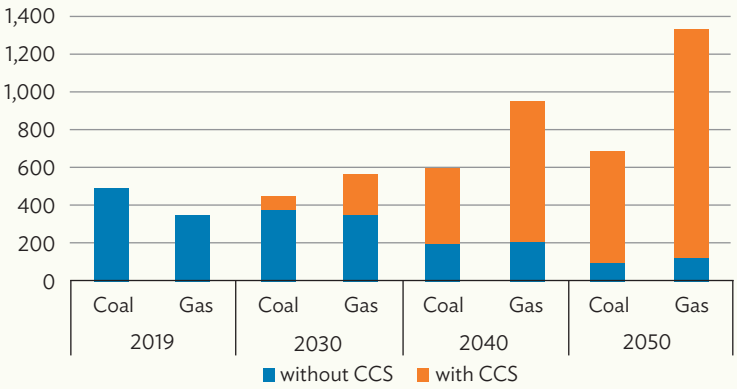
Mtoe = million tons of oil equivalent.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han, August 2023).

Carbon Capture and Storage

CCS will be applied in the power sector for both coal and gas power plants mainly in 2040. Year by year, thermal power plants with abatement (CCS) will increase until 2050, with gas power generation with CCS reaching 91% and coal power generation with CCS reaching 85% in 2050 (Figure 3.11).

Figure 3.11: Penetration of Carbon Capture and Storage in the Power Sector under the Low-Carbon Energy Transition: Carbon-Neutral Scenario, 2019–2050
(TWh)



CCS = carbon capture and storage, TWh = terawatt-hour.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

3.4 Cost Comparison of the Business-as-Usual and Low-Carbon Energy Transition: Carbon-Neutral Scenarios

3.4.1 Basic Concept

As shown in the previous section, the BAU scenario will continue to consume fossil fuels, while the LCET-CN scenario will shift from fossil fuels to renewable energy, hydrogen and ammonia, and CCS. This chapter attempts to forecast the energy costs of both the BAU and LCET-CN scenarios.

3.4.2 Fuel Cost

The coal, oil, gas, and hydrogen costs in 2050 under the BAU and LCET-CN scenarios are forecast as fuel costs. Looking at the increase in each fuel from 2019 to 2050, the fuel cost is defined as the incremental amount multiplied by the unit cost of the fuel. We assume the price of coal at $98 per ton in 2050, oil at $100 per barrel, gas at $7.5 per million British thermal units (BTU), and hydrogen at $0.30 per normal cubic meter. The incremental amount of each fuel during 2019–2050 is derived from the BAU and LCET-CN scenario results of the EAS Energy Outlook. The fuel cost projections for 2050 are shown in Table 3.1.

Table 3.1: Fuel Cost Projections, 2050
($ billion)

Fuel Type	BAU	LCET-CN
Coal	50	0
Oil	240	30
Gas	70	40
Hydrogen	0	180
Total	**360**	**250**

BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon-Neutral.

Source: Kimura and Han (2023).

Hydrogen dominates the fuel costs under the LCET-CN scenario, but the total fuel cost of the LCET-CN scenario will be lower than under the BAU scenario because of savings from fossil fuel consumption across the sectors if the current unit cost of fossil fuels continues until 2050.

3.4.3 Power Investment Cost

The BAU scenario will continue to use thermal power plants, while the LCET-CN scenario will rapidly increase variable renewable, traditional renewable, nuclear, and hydrogen power plants. We estimate the additional capacity needed from each power source from 2019 to 2050 based on the EAS Energy Outlook under both the BAU and LCET-CN scenarios (Figures 3.12 and 3.13). The BAU scenario will significantly increase the capacity of coal and gas power plants, while the LCEN-CN scenario will considerably increase the capacity of solar, hydro, wind, and gas power plants. Based on the increase in the capacity of power sources and the assumed unit capital cost of each power source, the estimated power investment costs are in Table 3.2.

Table 3.2: Power Investment Costs
($ billion)

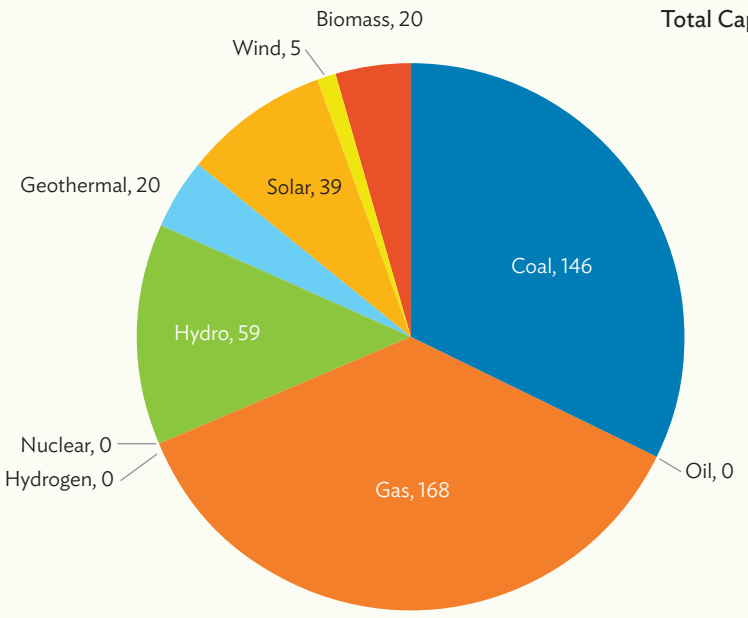
Type of Power	BAU	LCET-CN
Thermal power	340	75
Renewable power	295	790
Other	0	45
Total	635	910

BAU = business as usual, LCET-CN = Low-Carbon Energy Transition: Carbon-Neutral.

Source: Kimura and Han (2023)

The power investment cost will be about 40% higher under the LCET-CN scenario than under the BAU scenario, and renewable power (e.g., hydro, wind, and solar) will comprise more than 80% of the total investment.

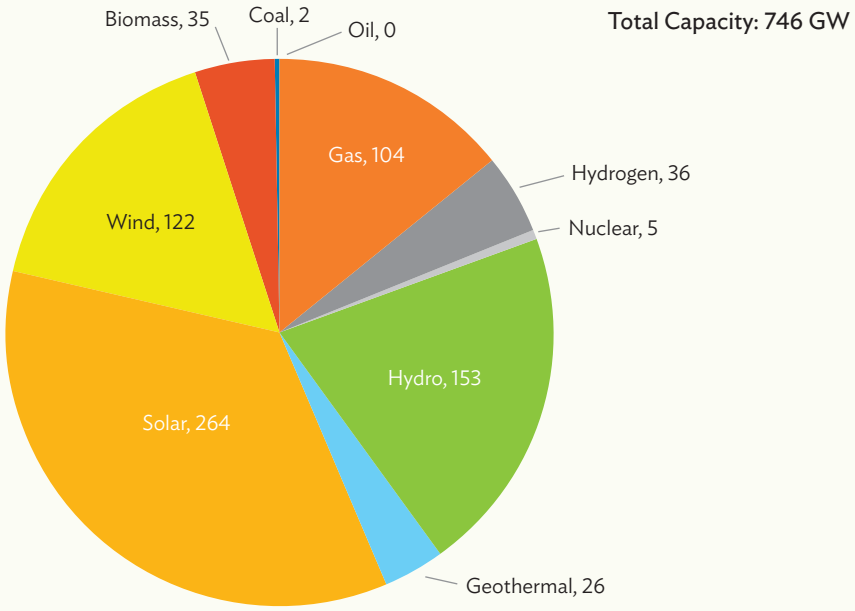
Figure 3.12: Additional Power Capacity Mix under Business as Usual, 2019–2050
(GW)



GW = gigawatt.

Source: East Asia Summit Energy Outlook 2021–2022 (Kimura and Han 2023).

Figure 3.13: Additional Power Capacity Mix of the Low-Carbon Energy Transition–Carbon Neutral Scenario, 2019–2050 (GW)



GW = gigawatt.

Source: EAS Energy Outlook 2021–2022 (Kimura and Han 2023).

3.4.4 Carbon Capture and Storage Cost

We assume that CCS covers capturing CO_2 at the emissions sites (mainly coal and gas power plants), transporting CO_2 via ship or pipeline, and storing it in saline formation or in oil and gas wells (i.e., carbon dioxide enhanced oil recovery [CO2-EOR] or carbon dioxide enhanced gas recovery [CO2EGR]). First, we estimate the CO_2 amount to apply CCS in 2050 based on coal and gas power generation with CCS from the EAS Energy Outlook results, then we multiply it by the unit cost of CCS in 2050. We assume the unit cost of CCS at $30 per ton of CO_2 equivalent (tCO_2e) in 2050. The estimated CCS cost for each scenario is shown in Table 3.3.

Table 3.3: Carbon Capture and Storage Cost

Item	BAU	LCET-CN
CCS	$0	$20 billion

BAU = business as usual, CCS = carbon capture and storage, LCET-CN = Low-Carbon Energy Transition: Carbon-Neutral.

Source: Kimura and Han (2023).

3.4.5 Overall Cost Comparison

Table 3.4 summarizes the energy costs, which are estimated based on the EAS Energy Outlook results under both the BAU and LCET-CN scenarios, with the assumed unit costs of fossil fuels, power sources, hydrogen/ammonia, and CCS as mentioned above.

Table 3.4: Energy Costs ($ billion)

Item	BAU	LCET-CN
Fuel cost, 2050	360	250
Power investment, 2019–2050	635	910
CCS, 2050	0	20

BAU = business as usual, CCS = carbon capture and storage, LCET-CN = Low-Carbon Energy Transition: Carbon-Neutral.

Source: Kimura and Han (2023).

The BAU scenario will require $360 billion to purchase fossil fuels (i.e., coal, oil, and gas) in 2050, while the LCET-CN scenario will need $930 billion to reduce CO_2 emissions from thermal power plants applying CCS technology. For power investment, the LCET-CN scenario will require $910 billion to increase zero emission power sources compared with the BAU scenario. If the unit costs of fossil fuels, CCS, and each power source change, these cost comparison results will also change. In any case, the BAU scenario will need to purchase significant amounts of fossil fuels until 2050, while the LCET-CN scenario will need to invest in increasing zero emission power plants and CCS.

3.5 Policy and Financing Issues

3.5.1 Necessary Policy Support to Achieve Carbon Neutrality

AMS are very diverse in terms of land area, national income, population, and available natural resources; therefore, their carbon-neutral pathways should vary accordingly. Myanmar, the Lao People's Democratic Republic, Cambodia, and Viet Nam are rich in hydropower resources. On the other hand, the southern part of ASEAN—Malaysia, Indonesia, and Thailand—is rich in fossil fuels. Only solar energy is available in all AMS. Thus, all AMS are committed to increasing their solar photovoltaic (PV) systems because of the remarkable decrease in the cost of solar PV. Areas with viable wind power are limited in the ASEAN region, but if independent power producers can sell the electricity generated by wind power systems to national power companies at affordable prices, wind power systems will penetrate other areas. Hydrogen, including ammonia, and CCS are new technologies for AMS, so their governments are seeking business opportunities to apply these technologies with the collaboration of developed countries such as Japan. Such technologies will need to use a supply chain or value chain, which will support hydrogen trade from hydrogen producing countries to consuming countries, and CO_2 trade from capturing countries of CO_2 to storing countries. Therefore, we recommend that the governments seek participation in those regional supply chains.

3.5.2 Financing Support for Zero Emission Technologies

High-income countries such as Singapore and Malaysia will continue to support zero emission technologies (e.g., hydrogen and CCS) financially, allocate national budget to research and development expenditure, and provide subsidies to final users. The establishment of national and regional carbon markets and taxes will incentivize final users to shift from fossil fuels to low-carbon or zero carbon energy use. It is essential to seek financing from multilateral development banks such as the World Bank and Asian Development Bank for clean energy facilitation and regional financing schemes (e.g., Energy Transition Finance) for energy transition technologies (e.g., biomass and ammonia co-firing with coal power plants and hydrogen co-firing with gas power plants).

3.6 Conclusions and Recommendations

3.6.1 Conclusions

ASEAN could achieve carbon neutrality by 2050–2060 by pursuing the following pathway: (i) reducing energy consumption and accelerating electrification across the final sectors; (ii) increasing renewable electricity (e.g., hydro and solar) and shifting from coal to gas power generation; and (iii) applying hydrogen and CCS in the final and power sectors commercially after 2040. The projected cost of achieving carbon neutrality by 2050 comprises $250 billion for fuel costs (fossil fuels and hydrogen), $20 billion for CCS in 2050, and $910 billion for investment in zero emission power sources from 2020 to 2050. Thus, appropriate financial mechanisms—from both the public and private sectors—will be necessary to cover the huge cost of the low-carbon energy transition.

3.6.2 Recommendations

We offer the following recommendations for ASEAN to achieve carbon neutrality by 2050 or 2060:

(i) Enact EEC legislation, if not yet done, and promote energy saving under the act.
(ii) Support the deployment of electrification technologies (e.g., electric vehicles and heat pumps) to replace oil and gas consumption in the final sectors, including financial mechanisms.
(iii) Increase variable renewables (e.g., solar) because of their lower generation costs, as well as policy support (including feed-in tariff systems), paying attention to the capacity of the national power grid.
(iv) Encourage hydrogen and ammonia co-firing projects to be set up at existing coal and gas plants through international cooperation frameworks (e.g., the Asia Energy Transition Initiative) to increase understanding of the effect of hydrogen and ammonia in achieving carbon neutrality.
(v) Participate in carbon capture, utilization, and storage (CCUS) platforms (e.g., the Asia CCUS Network) to acknowledge the importance of the CCUS value chain in Asia (e.g., ASEAN + Australia, Japan, and the United States) and monitor technical and financial development.
(vi) Produce a national carbon-neutral pathway that considers country-specific characteristics such as income level, population, land area, and available natural resources.

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CHAPTER 4

ASEAN Green Energy Transition: From Pledges to Implementation

Alexander Charalambous

4.1 Introduction: Why a Low-Carbon Economy Transformation of the ASEAN?

The ASEAN Member States (AMS) have experienced sustained economic growth in the last 50 years, a trend that is projected to continue, despite ongoing global and regional challenges (ADB 2023). Economic growth in the region has been largely perceived as human progress, and is associated with improvements in human well-being, including poverty reduction and increased access to quality education and health services. At the same time, triggering and sustaining high economic growth levels has put pressure on the region's natural environment (for years treated as an externality), contributing to increased pollution, notably greenhouse gas (GHG) emissions and chemicals, including plastics.

Southeast Asia has been particularly vulnerable to climate change, which poses significant risks to a liveable and sustainable future in the region. Besides rising sea levels, people and natural ecosystems across the region are exposed to increasingly intense and unpredictable weather events like typhoons, heat waves, extended droughts, and floods. Such adverse impacts are widespread. They are also associated with significant financial losses and damages to nature and people, including in agriculture and infrastructure.

The impact on natural and human systems (notably climate risks) stemming from a continuous rise in GHG emissions in the region and globally, including those outlined in the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC 2023) are well acknowledged by ASEAN countries. In response, the member countries have collectively reiterated their commitment to meeting the Paris Agreement's goal of limiting the increase in global average temperature to less than 2°C above pre-industrial levels, with aspirations to limit warming to 1.5°C (ASEAN 2022).

Delivering on the goals of minimizing human-induced global warming requires a shift to net-zero carbon emissions within a climate positive pathway (net negative emissions). This transition has a strict timeline. According to the IPCC (2023), action to reduce carbon emissions taken in this decade will largely determine whether or not a 1.5°C or 2°C limit can be effectively applied to global warming.

4.2 Shifting ASEAN Toward a Low-Carbon Economy: The Pledges

The ASEAN's climate change mitigation ambition, as expressed in the Nationally Determined Contributions (NDCs), responds to recent calls by the United Nations Climate Change Conference (COP27) for countries globally to accelerate efforts toward: (i) phasing down unabated coal power; (ii) phasing out inefficient fossil fuel subsidies; and (iii) accelerating clean and just transitions to renewable energy, while enhancing security, reliability, and resilience of energy systems (Table 4.1). This is not to be seen as a new policy shift, with several AMS having also signed the Global Coal to Clean Power Transition Statement (COP26), committing signatory countries to rapidly develop clean power;

increase energy efficiency and phase out the use of coal in energy production, including by scaling up relevant policies and technologies, ending the issuance of permits, direct government support, and construction of new unabated coalfired power plants; and providing robust social, technical and financial support to affected workers, communities and sectors, scaling up mitigation ambition and implementation.

Notwithstanding the emphasis put on the paramount importance of energy security and the need for additional international financial and technical support, these ambitions and commitments, without

Table 4.1: ASEAN Climate Change Mitigation Ambition and Action as Expressed in the NDCs

Country	Targets 2030 vs 2010 baseline*, relative to BAU levels. Reduction in GHG emissions by:		Sectors	Types of Mitigation Action / Measures *(1)=Renewable energy production; (2)=Industrial emissions reduction; (3)=Domestic emissions reduction; (4)=Nature-based solutions; (5)=Waste management; (6)=Sustainable transportation and mobility; (7)=Smart grids and power management; (8)=Uptake of circular economy and sustainable production & consumption practices; (9)=Other (e.g. raising awareness, monitoring, green tourism, etc.)*
	Unconditional	**Conditional**		
Brunei Darussalam	20%	N/A	Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Uses (FOLU), Waste	(1); (2); (4); (5); (6); (7)
Cambodia	N/A	41.7% [59.1% from FOLU]	FOLU, Energy, Agriculture, IPPU, Waste, transport, building	(1); (2); (4); (5); (6); (7); (8); (9)
Indonesia	31.89%	43.2%	Energy, Agriculture, FOLU, Waste, IPPU	(1); (4); (5); (9)
Lao PDR	60%	N/A	Land Use Change and Forestry (LUCF), Energy, Hydropower, Energy efficiency, Transport	(1); (3); (4); (5); (6); (9)
Malaysia	45%	N/A	Energy, IPPU, Waste, Agriculture, Land Use, Land Use Change and Forestry (LULUCF)	N/A
Myanmar	244.52 (Mt) CO_2e	414.75 (Mt) CO_2e	Energy, Transport, Agriculture, LULUCF	(1); (2); (3); (4); (6); (7)
Philippines	2.71%	72.29%	Agriculture, Waste, Industry, Transport, Energy	(8)
Singapore	60 (Mt) CO_2e	N/A	Energy, IPPU, Agriculture, LULUCF, Waste	(3)
Thailand	30%	40%	Economy-wide (excluding LULUCF)	(1); (5); (6); (7); (9)
Viet Nam	15.8%	43.5%	Energy, Waste, Agriculture, LULUCF, Industrial Processes (IP)	(9)

*except Brunei (2015), Lao PDR (2000), Malaysia (2005), Thailand (2005).

Source: Author's / Living Prospects' compilation from the official ASEAN countries' NDCs.

a doubt, represent a bold move by AMS toward transitioning away from coal. They do not come as a surprise, though. They reflect the stated intentions by numerous financial institutions to cease funding for new coal plants if they are likely to have major climate change contributions. They also mirror prudence and foresight from decision makers operating in one of the world's largest coal markets.

The ASEAN region has made clear its desire to achieve net-zero GHG emissions or become carbon neutral soon. All AMS have announced relevant targets with a 2050 horizon, in line with the 1.5°C target set by the IPCC, except Indonesia, which has set a longer timeframe (net-zero by 2060), and the Philippines, which has yet to make relevant pledges, despite its promise to reduce and avoid GHG emissions by 75% within the period 2020–2030 (compared with a business-as-usual scenario).

4.3 Moving from Pledges to Implementation: How to Deliver on ASEAN Countries' NDCs/Net-Zero Ambitions?

According to the ASEAN Centre for Energy (ACE 2021), total installed power capacity in the region in 2020 was 285 GW, with renewable energy sources contributing 33.5 percent (including Hydropower, 20.9%; Geothermal, 1.4%; Solar, 8.0%; Wind, 0.9%; Bioenergy, 2.1%; Other 0.1%), and fossil-fuels 64.5 percent (Coal, 31.4%; Oil, 4.2%; Gas, 30.9%). Delivering on the NDCs and the stated net-zero ambitions requires deep reductions of GHG emissions across all economic sectors and systems. This, in turn, calls for ASEAN countries to significantly accelerate and scale-up the implementation of their wide portfolios of mitigation measures (Table 4.1). However, a number of challenges cast legitimate doubts over the capacity of ASEAN countries to deliver on their pledges and ambitions, notably:

(i) The **increased demand in primary energy required to sustain high annual economic growth rates and meet the energy needs of growing populations**, while also adhering to ambitious carbon neutrality pledges. According to the Asia Pacific Energy Research Centre (2022) estimates, total energy demand in the 6 largest ASEAN economies will increase by 218% in a business-as-usual (BAU) scenario and by 166% in a Carbon Neutral (CN) scenario. For ASEAN countries to meet this growing energy demand, significant energy generation and grid infrastructure investments are required; these are unlikely to be limited to renewables only, especially when considering current available technologies and capacities, as well as market prices. The projected energy demand is more likely to require parallel investments in fossil-fuel power generation infrastructure, thus prolonging ASEAN countries' dependence on natural gas and/or coal, and undermining their low-carbon development goals, let alone any net-zero aspiration. Current projections (Zheng 2022) already foresee growth in ASEAN coal-fired power generation as well as in CO_{2e} power sector emissions until 2030. Reliance on hydrocarbons is expected to ease post 2030 when more renewable energy projects would have matured, while GHG emissions will also even out, reflecting an expected retirement of coal capacity (some 20GW in total, including 40% from Malaysia) and an increase in gas capacity (by some 54 GW) aimed to stabilize power output. All in all, when it comes to total emissions in the ASEAN region, the combined growth in renewables and phase-down of coal will only reverse the current trends post 2040. GHG emission reduction is likely to accelerate from 2045 onward (grid emission factor projected to reach 0.18 kg/kWh by 2050, down from 0.54 kg/kWh in 2019), due to the combined effect of multiple decarbonization measures being implemented in the region, with a number of carbon capture and storage (CCS) technologies being mainstreamed in thermal power plants as a complementary measure to coal capacity retirement.

(ii) **Ensuring energy security in a new geopolitical era renders the stability of electricity supply a matter of affordability**. Coal imports have increased as a temporary substitute for the lack

of supply of oil and natural gas from the Russian Federation, with Malaysia, the Philippines, and Thailand being highly dependent on global coal supply (compared with other ASEAN countries), accounting for 70% of total ASEAN coal imports from the world market (ACE 2023). Due consideration of high LNG price volatility is necessary in a market underpinned by strong global competition, notably from European countries looking for substitutes to natural gas previously imported from Russia. As a result, natural gas added to the ASEAN countries' energy mix is more often used to meet growing demand than replace coal as an energy source.

(iii) The need for **rapid deployment of clean energy at a pace and level seemingly exceeding the region's ability to deliver, manage, and secure financing for related investment projects**. In many cases, net-zero pledges by ASEAN countries are not supported by concrete implementation strategies, let alone detailed financing plans. According to the International Energy Agency, Southeast Asia will need an annual investment of $190 billion to reach its climate goals by 2030, which is $120 billion more than the average annual investment reported from 2016 to 2020 ($70 billion in total, mainly in Viet Nam) (IEA 2022). Moreover, a significant part of NDC commitments is conditional on external funding, rendering it impossible to achieve related targets without external support. This indicatively includes up to 25% of Thailand's, over 55% of Viet Nam's, and over 96% of the Philippines' decarbonization commitments. Creating new infrastructure for renewable energy generation is a considerably more expensive solution than modernizing and expanding existing infrastructure. This is because for renewable energy generation to be effective, additional investments in grid infrastructure and management are necessary. A relevant example comes from Viet Nam, where, in 2019, installed solar power capacity rocketed to levels more than 47 times higher than the previous year (integration of some 5 GW into the grid); however, only part of that capacity was actually converted to usable electricity as the country lacked sufficient energy storage, grid management infrastructure, and know-how to deal with the intermittent and weather-dependent nature of solar systems. This fact alone may compromise the great potential of renewable energy generation in ASEAN countries to lift the energy system away from hydrocarbon dependency as a baseload source. It underscores the importance of countries investing in energy storage, as well as integrating related investments in their energy and grid capacity planning (currently insufficiently factored in or not at all). Diversifying and interconnecting the energy systems, while increasing the existing infrastructure's resilience and flexibility to become fit for large shares of variable renewable energy may further add to the cost of a low-carbon development path; however, the requirements of related investments (in terms of expertise, finance, market adaptation, land-use change, etc.) have so far not been taken into consideration. Additional investment in innovation, including alternative fuels (e.g. hydrogen or ammonia), may offer solutions to mitigate the described challenges and accelerate the green energy transition; however, such technologies are largely at a nascent stage of development both globally and regionally (notably in Indonesia and Malaysia, where tests have been carried out for combined ammonia-coal fuels feeding power generation plants or for converted LNG infrastructure to be used for liquified hydrogen), and have yet to prove their feasibility (IRENA 2022).

(iv) **Power Development Plans (PDPs) retaining coal and gas as the backbone of energy provision in the region (baseload fuel source)**, in some cases with additional coal power capacity are currently under construction (APAEC Phase II: 2021–2025). Current PDPs mostly do not reflect the coal phase out plans, neither do they align with their net-zero targets—although intentions to elaborate new or revised power plans have been announced in some of the region's largest economies (Thailand, the Philippines, Malaysia, Indonesia, Viet Nam). Notwithstanding the commitments expressed by ASEAN countries to halt new coal-fired power plant construction, their existing infrastructure is relatively new, with potential to remain in use for several more decades. This fact, combined with conflicting interests by a number of governments in the region featuring key stakeholders of fossil fuel production (through their

state-owned energy enterprises), further complicates incentives for energy transition. Current plans for LNG infrastructure, including facilities scheduled to be completed post 2030 are expected to strongly influence any decision on a preferred baseload fuel source, by locking in natural gas for several decades. This may appear useful as a strategy to phase out coal (currently a main baseload fuel source in the region), but will also put aside any plans for major uptake of renewables.

(v) The **uneven progress anticipated among individual ASEAN countries (regional variation)**. Financing is a major issue for several ASEAN countries as the NDC conditional commitments indicate. This is not the case for countries like Thailand and Singapore, where both state-owned and private sector energy companies are sufficiently capitalized and well-positioned to make riskier investments. In the aforementioned countries, international expertise and support for the development of long-term capacities is of greater importance. What is more, regional imbalances exist in the availability of energy sources. Coal production, for example, mainly takes place in only two ASEAN countries (Indonesia and Viet Nam); the latter being responsible for almost 90% of the coal produced in Southeast Asia, thus rendering relevant efforts to transition away from coal a complicated exercise. Similarly, natural gas imports in the ASEAN happen mainly in Thailand and Singapore (30% and 29% of total imports in 2021, respectively), with the remaining quantities being imported in Viet Nam (8%), the Philippines (6%), and Cambodia (1%). Lastly, emission peaks in the ASEAN countries are not expected to occur in the same time period, as progress remains uneven.

Against this alarming backdrop, three opportunities are likely to be the game-changing catalyzers needed for ASEAN's clean energy transition to succeed:

(i) The region boasts a **large**, **still mostly untapped**, **renewable energy potential**, with variable renewable energy and energy storage technologies potentially playing a central role in reaching net-zero emissions. Beyond solar and wind power sources, several ASEAN countries (including Indonesia, Viet Nam, and the Philippines) have significant geothermal resources—a clean and reliable source of heat and electricity, with potential uses in district heating, agriculture, and fisheries (greenhouses, milk pasteurization, fish farming, refrigeration, food dehydration), and ground source heat pumps (among others)—as well as capacity for the development of small hydroelectric power generation plants (including Cambodia, Indonesia, Lao PDR, Myanmar, Thailand, and Viet Nam). The launch of regional initiatives like the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) further expands opportunities to promote green and renewable energy generation (Singapore's Ministry of Trade and Industry 2022).

(ii) An accelerated decoupling trend of economic activity from energy demand in Southeast Asia is projected, with economic activity in the region expected to more than triple in size by 2050 and energy demand to only double in the same period (Asia Pacific Energy Research Centre 2022). This could be attributed to significant and continuous improvements in both energy efficiency (Liu et al. 2020) and material productivity (OECD 2023), evident in most ASEAN countries. In addition, growth in electrification sustains a gradual move away from carbon-intensive power generation (fossil fuels, notably coal and oil). **Sustainable consumption and production, and the shift to a circular economy can bring significant benefits in terms of energy demand and emissions reduction**, with circularity considerations currently being largely absent from the region's energy transition discussion. The circular economy contributes to minimizing demand for natural resources as primary input for products without compromising economic and social returns. As such, it reduces GHG emissions along the lifecycle of products, by preventing emissions associated with resource extraction and processing, the latter accounting for about half of the global GHG emissions (IRP 2019).

(iii) In an uncertain geopolitical era, the financing and development of quality green energy infrastructure has the potential to function as **a safe entry point** for countries leading the transition, **to deepen bilateral and multilateral cooperation across the ASEAN region**. The European Union, with its Green Deal and implementing strategies (notably the EU Circular Economy Action Plan), has openly stated its ambition to lead a global transition to an inclusive, low-carbon, circular economy, and several of its member states (notably Germany, but also Denmark and France, to name a few) are actively pursuing this objective in the ASEAN region, offering technical assistance, know-how, and financial support to relevant investments (including grants and guarantees). The United States follow a similar path, in line with its recently stated goals of promoting renewable energy and deepening partnerships with countries in the region (Fallin et al. 2023). International cooperation and partnerships providing improved access to finance, technology, know-how, and technical assistance are in most (if not all) cases critical enablers with a strong potential to accelerate a low-carbon development transition.

Notwithstanding the many similarities in terms of AMS targets and GHG emission mitigation approaches, each ASEAN country has its own policy mix to implement, reflecting individual priorities. This may include incentives to: direct and scale up investments toward renewable power generation or the use of emerging low-carbon energy technologies, such as green hydrogen, energy storage solutions, bio energy and nature-based solutions, energy-efficient equipment, and carbon capture, utilization and storage (CCUS); induce behavioral and lifestyle changes toward increased sustainability; or promote a circular economy. Yet, policies facilitating the reduction of emissions associated with coal power generation are a common denominator within the region, and a sine-qua-non for net-zero/carbon neutrality (Bocca 2023), largely addressed through multilateral energy initiatives. Relevant initiatives indicatively include: the Japan-U.S.-Mekong Power Partnership (JUMPP); the Just Energy Transition Partnerships (JETP) with Indonesia and Viet Nam; the ASEAN Centre for Climate Change (ACCC) (in Brunei Darussalam), which is mandated to operate as a climate action regional centre for excellence, knowledge hub, and strategic coordinator in the ASEAN region; and the Energy Transition Mechanism (ETM) of the Asian Development Bank.

4.4 Multilateral Energy Initiatives: Spotlight on the Energy Transition Mechanism

The Asian Development Bank (ADB) launched the Energy Transition Mechanism (ETM) in 2021 as a market-based approach aimed to reduce GHG emissions by phasing out fossil fuel power plants and replacing them with clean energy alternatives in Asia and the Pacific. Working together with its member countries as well as regional and international stakeholders, ADB has studied and piloted a scalable, pioneering, blended-finance model to catalyze a just transition to clean energy, with global implementation potential.

The ETM is designed to use concessional and commercial capital to accelerate the retirement or repurposing of polluting power generation units (shorten the life of legacy coal power assets) and at the same time unlock new renewable energy investments, including support for enhanced grid capacity for renewable energy. It involves the elaboration of feasibility studies, the establishment of country platforms (government financing and investment frameworks created to fund and manage a country's energy transition activities), support for the development and enactment of relevant policy and regulatory measures (including a conducive environment for a just transition), and the facilitation of relevant investment transactions.

In 2022, ADB established the Energy Transition Mechanism Partnership Trust Fund (ETMPTF), linked to the Clean Energy Financing Partnership Facility, to mobilize public and private capital in support of ETM efforts to move away from carbon-intensive coal-based power plants and toward clean energy, in ADB's developing member countries (DMCs). Grant commitments of some €48 million in total have been announced by the Governments of Japan ($25 million) and Germany (€25 million), the latter coming from the International Climate Initiative (IKI) and are part of Germany's contribution to the Just Energy Transition Partnership (JETP) with Indonesia. Overall, ETM seeks to secure $2.5–$3.5 billion from public and private investors, as well as grants and highly concessional funds from philanthropies and governments.

4.4.1 Just Energy Transition Partnership (JETP) – Indonesia and Viet Nam

Indonesia is expected to receive $20 billion in public and private financing under the JETP, over the next 3–5 years. Assistance will be delivered in the form of grants, concessional loans, market-rate loans, guarantees, private investments, and technical expertise. A JETP Secretariat (reporting and analytical role) was set up by Indonesia in February 2023, to which ADB provides institutional support. ETM has the potential to be a key delivery mechanism for JETP.

Over the same period, Viet Nam is set to receive $15.5 billion under the JETP. Related assistance will focus on finance, technology, and capacity building, as well as policy and regulation improvement to increase private investment in renewable energy. A JETP Resource Mobilization Plan is expected to be published by Viet Nam in late-2023. ADB contributions through ETM and support to Viet Nam JETP Secretariat are likely.

ETM operates under a market-oriented process. Energy cost reduction stemming from early retirement of fossil fuel power plants increases the demand for clean energy by an estimated two to three times, with a positive long-term effect on the reduction of overall energy costs (ADB 2023). This in turn drives investment in cost-effective solutions in renewable energy generation as well as related clean technologies, including smart grids.

ETM implementation was initiated in the ASEAN region, with 3 pilot countries, namely Indonesia, the Philippines, and Viet Nam. It has recently been expanded to Pakistan and Kazakhstan. A customized approach to ETM implementation (transaction options) has been used to match the unique characteristics of each target country and ensure the prioritization of environmental and social safeguards (bespoke country ETM programmes leaving no community, industry, or worker behind). Notwithstanding the existence of multiple transaction options (indicatively including acquisition, synthetic, or portfolio models), project investors are committed under ETM to no new coal development and the host country is committed to pursuing the energy transition ambition as a pre-condition for any deal.

More specifically, current ETM implementation progress per country involves:

In Indonesia, options for an early retirement of a 660-megawatt coal power plant in Western Java are being explored by ADB in collaboration with Cirebon Electric Power (CEP), an independent power producer (IPP) and other partners, such as the state-owned electricity company (PLN), the Indonesian Investment Authority (INA); relevant MoU signed in end of 2022, with the main option being for ADB to provide an early retirement facility in the form of senior debt, on the condition that the tenor of the power purchase agreement between CEP and PLN will be shortened. Replicability to other IPPs in Indonesia is a key design parameter of the planned transaction under ETM, strengthened by INA's ability to offer complementary equity to scale up ETM activities in the country. In parallel,

ADB supports the design and operation of Indonesia's ETM Country Platform (including provision of staff resources and capacity building), as a supervising entity managing the broad structure of both current and future energy transition activities in Indonesia. ADB also supports the development of Indonesia's investment plan under the Climate Investment Funds Accelerating Coal Transition (CIF-ACT) program, indicatively focusing on labor transition, and skills mapping and development (including the establishment of centers of excellence for that purpose, in collaboration with academic institutions). CIF-ACT has received approval to access up to $500 million of concessional capital for program implementation in Indonesia.

In the Philippines, the feasibility of ETM implementation is still under review (pre-feasibility concluded in 2021; full feasibility study ongoing). ADB also supports the development of the Philippines investment plan under the CIF-ACT program; the latter has been provisionally allocated access to funds amounting up to $500 million for program implementation in the country.

In Viet Nam, the feasibility of ETM implementation is also under review (pre-feasibility concluded in 2021; full feasibility study under discussion with key ministries), with the relevant studies investigating key questions on project selection (asset identification); environmental, social, and governance (ESG) safeguards; transaction structuring and financial analysis; and fund/vehicle structuring options.

In Pakistan and Kazakhstan, technical assistance grants have been awarded to assess the ETM's feasibility ($300,000 and $225,000, respectively). The energy transition in Pakistan largely concerns (retirement/repurposing of) oil- and diesel-fired power plants (as opposed to coal-fired plants). In Kazakhstan, the grant has been awarded in consultation with the Ministry of Energy and the feasibility study mainly focuses on the retirement or repurposing of coal-fired and combined heat-power plants.

The ETM's design duly acknowledges specificities like ASEAN's high concentration of relatively new coal-fuelled power plants, while at the same time it remains sufficiently broad to facilitate replication to other countries, indicatively in Africa and Latin America or across Asia and the Pacific. Scaling out implementation to other countries and regions would be subject to meeting the key conditions enabling ETM design elements to be deployed. These include the full range of stakeholders ADB works with in examining the feasibility of phasing out the coal-fired power plant investments, as well as elements facilitating the application of commitments on accountability and safeguards, taking due consideration of any social or other concerns that may be raised in that respect (FFA and NGO Forum on ADB 2022).

4.5 Mobilizing Sustainable Finance to Promote Energy Transition in Southeast Asia

Notwithstanding the sustainable debt market contraction in 2022, sustainable finance in ASEAN appears promising (Almeida et al. 2023). Having experienced rapid and continuous growth in previous years (Manuamorn et al. 2022), ASEAN's sustainable debt market—including green, social, and sustainability (GSS) bonds and loans, as well as sustainability-linked bonds (SLBs) and sustainability-linked loans (SLLs)—retained robust volumes (at $36 billion) despite the inevitable reaction to adverse market conditions (rising inflation and interest rates). What is more, according to IEA (2022) estimates, investment in clean energy technologies (mainly in solar PV, wind, and grids) averaged $28 billion annually between 2016 and 2020, accounting for about 40% of total energy investments in the same period and marking a significant gap in financial resources (of some $120 billion annually) needed to meet the stated climate objectives.

With reliance on public funds for sustainable energy transition remaining high, the financial sector is still far from assuming a catalytic role in accelerating a low-carbon development transition, despite strong stated intentions by key financial ecosystem stakeholders (ASEAN Finance Ministers and Central Bank Governors 2022). Several initiatives have been launched to increase regulatory certainty and the establishment of climate-friendly financial markets, responding to the need for further clarity on the climate risks of related financial assets and on definitions and metrics applicable to net-zero portfolio alignment, with a view to attracting private capital for sustainable investment.

Since 2020, solid steps have been taken toward cross-ASEAN cooperation and coordination within the broader sustainable finance ecosystem. These include initiatives at the strategic and operational levels, such as:

(i) the "Roadmap for ASEAN Sustainable Capital Markets" developed by the ASEAN Capital Markets Forum, aimed at prioritizing an enabling ASEAN capital markets ecosystem, offering an open and vibrant framework for the mobilization of private sector capital to finance sustainable projects;
(ii) the on-going Central Banks' "ASEAN Green Map," introducing a holistic approach to greening the regional financial system cutting across banking, insurance, capital market, and ancillary services; and
(iii) the development of the "ASEAN Taxonomy for Sustainable Finance" (ASEAN Taxonomy), a shared classification system for defining environmentally sustainable investments, toward incentivizing additional investment in activities that substantially contribute to combined environmental, social, and economic objectives (including climate action and the circular economy transition).

More specifically, the ASEAN Taxonomy Board[1] has published 2 versions of the progressively developed ASEAN Taxonomy, with the first one (2021) providing a principles-based overarching framework, and the second (2023) expanding the framework to both integrate inputs from stakeholders (notably the introduction of "Social Aspects" as the third essential criterion,[2] next to "Do No Significant Harm" and "Remedial Measures to Transition"). It also provides guiding questions, decision trees, and examples addressing all environmental objectives and essential criteria (classifying green and transition activities), as well as technical screening criteria for the energy sector (i.e., 1 of the 6 covered under the ASEAN Taxonomy, with the other 5 expected to be developed over the next 2 years).

The taxonomy caters to a diverse set of likely users, including member states, regulators, banking institutions, users of capital, and rating agencies. Acknowledging the lack of standardized and credible data, it provides overall guidance with the potential to be further tailored to fit national contexts, serving as a common language for sustainable finance in the region. Six ASEAN member countries have developed or are in the process of developing national taxonomies, namely Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. The scope of national taxonomies varies, with some of the countries deviating from the principles-based approach used in the ASEAN taxonomy, to establish defined criteria for a list of activities.

ASEAN taxonomy is not developed in isolation. Existing international green investment standards and other regional taxonomy initiatives, notably the European Union's (EU) Sustainable Finance Taxonomy (European Commission 2023), offer opportunities for raising the benchmark of sustainable

[1] Established under the auspices of the 7th ASEAN Finance Ministers' and Central Bank Governors' Meeting held in March 2021.

[2] Comprising 3 key social aspects, namely, Respect for Human Rights, Prevention of Forced and Child Labour, and Impact on People Living Close to Investments.

finance ambition. ASEAN alignment with relevant international frameworks, however complex, is expected to satisfy international investors' firm and justifiable demand. Moreover, global initiatives like the International Platform for Sustainable Finance (launched in 2019, with Indonesia joining a year later) offer a relevant multilateral dialogue forum that can facilitate exchange of best practices and benchmarks, as well as encourage discussions on sustainable finance opportunities and challenges within diverse regional and national contexts.

In terms of content, the ASEAN taxonomy considers (among others) the potential role of coal-fuelled power plant phase-outs in reaching the region's climate objectives, with the use of quantitative criteria reflecting the efficiency and maturity/age of the plants, like emissions intensity, absolute emissions reduction, and relative emissions reduction in period of operations. Specific attention has been given to addressing inter-regional diversity when it comes to coal plant phase-outs, with the taxonomy balancing ensuring inclusion of all ASEAN member countries and safeguarding credibility and interoperability with other relevant taxonomies (including at the national level). Related criteria introduce a novel field for a regional taxonomy, one that merits further review and discussion with stakeholders of the international community toward effective implementation.

4.6 Recommendations

This chapter has highlighted the importance of enhancing sustainable finance in the region, for ASEAN countries to accelerate their transition to a low-carbon economy and deliver on their climate promises. A set of 4 areas for action are identified to support this process:

(i) Fostering a conducive policy environment

a. ASEAN governments may consider working with the financial community to provide **enabling policy frameworks for low-carbon economy investments**. Public policies and concerted government interventions are necessary to develop a conducive investment climate and business environment, including regulatory certainty for climate-friendly assets and low-carbon economy projects. Enabling frameworks may steer the energy transition and establish secure and resilient conditions for both economic operators and public administrations, influence trends in consumption patterns, and scale-up uptake of circular economy practices with significant benefits to the attainment of climate objectives. They can also ensure coherence across relevant policy areas such as the economy, finance, energy, trade, skills and employment, and environment. Scaling up regional cooperation on policy / regulatory measures can respond to the growing momentum for action in ASEAN member countries, in line with the ambition formulated in the respective NDCs.

b. **Stronger attention to definitions, norms, and standards, including relevant progress in the development of the ASEAN taxonomy, should be matched with both robust incentives and enforcement**, to increase the likelihood of actual investments materializing. Coordinated action on labelling and standards for financial instruments fit for financing the energy transition, beyond the development/endorsement of a taxonomy, are required to increase simplicity and transparency. Support for harmonization of standards and compliance among ASEAN countries will also contribute to improved interoperability of sustainable energy systems, thus providing greater resilience and effectiveness.

(ii) Securing a level playing field

a. Financing institutions may consider **securing a level playing field for low-carbon economy investors** with regard to financing conditions. This would entail a better assessment of **sustainable infrastructure value**, longer-term economic potential, and related risks, and would in turn increase the number and size of financial products and services available for public and private energy companies investing in low-carbon energy solutions. It would

also imply putting in motion a transparent process of internalizing the full range of costs and risks of energy-related investments, including environmental and social ones. Lastly, it would involve raising awareness of the investment community regarding the prospects for redirecting financial flows away from polluting forms of energy generation or from investments that are based on the unsustainable use of resources.

(iii) Embracing the entire sustainable energy ecosystem

a. ASEAN governments may consider **a dual focus on financial institutions and the private sector**, to enable, facilitate, and reward collaboration among institutions promoting sustainable finance, on the one hand, and sustainable project developers on the other, including through networking and intermediation, and where necessary, also offering appropriate incentives such as guarantees or other de-risking mechanisms. Support to the private sector in particular can increase financial knowledge, thus enabling entrepreneurs to develop bankable projects.

b. Policy makers, industry participants, investors, technology providers and civil society must seize the opportunity to **work together in a community/ecosystem approach** offering opportunities to share capabilities on operational policies, processes, standards, technological innovations, and metrics to design and deploy low-carbon energy networks across the ASEAN region.

c. ASEAN governments may also consider **deepening bilateral and multilateral cooperation with international partners** to accelerate the energy transition. Partnerships with stakeholders of the international community may provide access to best practices and state of the art technologies, technical assistance, know-how, and financial support to relevant investments (including grants and guarantees). It may also strengthen ASEAN's energy transition credibility and buy-in, with both regional and international investors.

(iv) Broadening the scope of action

a. Project developers and investors may consider **harnessing a broader range of clean energy investment opportunities,** beyond solar and wind power generation. This may involve an increased focus on ASEAN's (still abundant) untapped renewable energy potential, and on associated grid technologies, notably energy storage systems, which together form essential requirements for the region's energy transition. It may also entail mainstreaming tested approaches for phasing out polluting coal-fired power generation plants (notably the Energy Transition Mechanism) or expanding their implementation to phase-out other high CO2-emitting fossil fuel-based energy generation plants.

b. ASEAN governments may consider **tapping on the significant climate benefits offered by a circular economy transition**. This may imply facilitating improvements in both energy efficiency and material productivity by embedding circularity in manufacturing toward minimizing demand for natural resources as primary input for products, or by incentivizing the development of secondary material markets feeding into priority sectors (like construction and buildings).

c. ASEAN governments may also consider a **more proactive approach to safeguarding inclusiveness**. Due attention to affordability, job security, decent job creation, notably for the communities directly affected by large-scale clean energy investments is necessary for a sustainable energy system. This may imply increasing the transparency of investment negotiation processes, including disclosing key information about investment plans that may have a direct impact on the lives of workers and communities. It may also entail building the capacity of civil society organizations and supporting their involvement in related processes; the latter with potential positive impact on the replicability of innovative clean energy investment facilitation approaches, such as the Energy Transition Mechanism.

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CHAPTER 5

Putting Climate Change Adaptation at the Center of Promoting Low-Carbon Economies

Agnes Surry

5.1 Introduction

The global potential response to climate change is embedded in the Paris agreement (United Nations 2015). It includes mitigation measures, which combine actions to reduce greenhouse gas (GHG) emissions and stop the increase in the global average temperature, and adaptation measures, which group actions to ensure countries and populations are better prepared and adapted to the adverse impact of climate change. Historically, the attention given to adaptation increased with the materialization of the adverse impact of climate change but is still given less priority in comparison to mitigation. How can long-term integrated adaptation measures be more prioritized? What are the main challenges faced by policy makers when they support this long-term process? What are the main instruments available to policy makers to support this agenda? The case for considering adaptation and mitigation as the faces of the same coin toward a successful and sustainable net-zero transition is however strong as the adverse impact of climate change is increasingly felt. This chapter argues that adaptation measures should be prioritized equally as mitigation and lays out the tools and frameworks that can support the mainstreaming of adaptation measures.

5.2 Challenges

5.2.1 Adaptation Remains Underinvested Globally Despite High Benefits

Adaptation refers to a process to adjust economic, social, and environmental systems to reduce the adverse impact of climate change on economies and populations. It takes time, and if it is done properly, can develop the ability of the economy and society to absorb and recover from climate shocks, thereby building resilience.

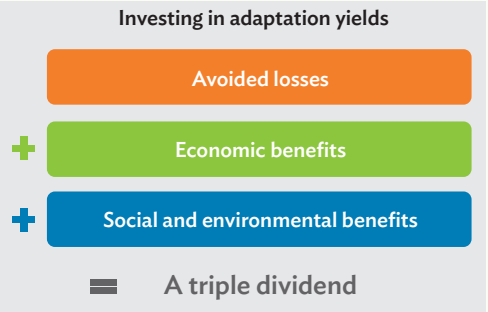
Despite immense benefits, the business case for adaptation is not straightforward. Adaptation measures do not necessarily generate direct financial returns. Benefits are generally perceived as low because some actions require high initial investments or investment gains from adaptation only materialize when there is a natural disaster. Gains tend to materialize as a smaller loss rather than positive gains. As a result, public and private actors do not prioritize adaptation measures and climate finance supporting adaptation is lagging. While annual adaptation financing needs in developing countries are estimated at $300 billion by 2030 (UNEP 2022), only 7% of total climate finance based on available data is supporting adaptation (Buchner et al. 2021).

Recently, despite this challenging situation, adaptation strategies have been increasingly perceived as a smart investment and even as a business opportunity for the private sector (Bloomberg 2021). The gray literature refers to a $2 trillion market for the private sector referring to market opportunities such as implementation of early warning systems, climate-resilient infrastructure, climate resilient seeds in the agricultural sector, global mangrove protection, and projects to make water resources more resilient. The World Bank found that every $1 invested in resilient infrastructure in low- and middle-income countries provides a benefit of $4 (World Bank and GFDRR 2021).

Indeed, while the financial and nonfinancial barriers to adaptation investment, which include information asymmetries and knowledge gaps (Goldar et al. 2023), are undeniable, benefits from adaptation investment are high (Figure 5.1) and can be grouped under three main categories as illustrated by the "Triple Dividend of Resilience" framework developed by Surminski and Tanner in 2016. Adaptation and resilience investment can (i) avoid human losses and infrastructure damage, (ii) provide economic benefits, and (iii) generate social and environmental benefits.

A recent additional analysis of the triple dividend approach shows that for many adaptation investments, the second and third groups of dividends (economic, social, and environmental benefits) increase even if the climate shock does not materialize (Heubaum et al. 2022). This is for instance the case of a nature-based adaptation solution such as a mangrove plantation that protects coastal areas from potential tropical storms and prevents erosion from sea level rise. At the same time, it sequesters carbon, improves water quality through its complex root systems that filter pollutants, thereby improving biodiversity and generating higher opportunities for fishing dependent communities.

Figure 5.1: Examples of Benefits from Adaptation and Resilience Measures



- Making infrastructure more climate-resilient entails an additional 3% cost and generates a 4 x benefit.
- 1 day warning of a coming storm mitigates the damage by 30%.
- The cost/benefit ratio of mangrove preservation and restoration is estimated at 1:10.

Source: Global Commission on Adaptation (2019).

5.2.2 Risk of Maladaptation

Another issue policy makers should also keep in mind is that developing adaptation measures independently or along mitigation measures needs to be done holistically and carefully as adaptation strategies can easily fail. It needs to take into consideration the country and/or sector context, all stakeholders, alternative options, and the short-term and long-term impact to be relevant and effective. Such a holistic and comprehensive process is critical to, eventually, avoid maladaptation, which is defined as "any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli" (IPCC 2001). Maladaptation refers to situations where climate vulnerability is increased, shifted, or where negative externalities are created.

While mitigation measures can increase climate vulnerability of communities,[1] maladaptation generally comes from inadequate adaptation measures that eventually increase climate vulnerability of an operation and its environment and block sustainable development. Maladaptation refers to

[1] This would be the case of the building of a dam to provide a clean energy source and which eventually, exacerbates the consequences of climate variability for agriculture dependent communities downstream of the dam as their access to water becomes limited.

solutions that appear to be good at first glance but can aggravate the vulnerability to climate change of economies and populations. There are several examples of maladaptation in the gray literature such as a seawall built to protect communities from rising sea-levels and ends by making people more exposed to floods because the wall blocks stormwater drainage. Another typical example is when farmers stop building adaptive capacities because they have insurance protecting them against climate-related disasters (Schipper 2020). Maladaptation is difficult to anticipate because adaptation is a process that takes time. An overall lack of planning, poor design, a siloed approach, and insufficient understanding of climate vulnerability sources are the main causes and policy makers should prioritize a systemic and holistic analysis of options when they make decisions on investments.

In scaling up adaptation strategies and in systematically mainstreaming adaptation measures when they design, plan, and implement mitigation strategies, policy makers can ensure low-carbon transitions are jointly implemented with smart adapted investment able to build resilient economies and societies.

5.2.3 A Snapshot of Climate Action in ASEAN Countries

The Association of Southeast Asian Nations (ASEAN) countries are experiencing dramatic climate change. Some ASEAN countries are large GHG emitters with per capita emissions above the world average (Brunei Darussalam, Malaysia, Singapore). Some ASEAN countries are highly vulnerable to climate change and face significant adaptation challenges (Cambodia, the Lao People's Democratic Republic, Myanmar, the Philippines) (Table 5.1).

Table 5.1: Emissions, Vulnerability, and Climate Adaptiveness of ASEAN Countries

Country	Per Capita Emissions (tons of CO_2) 2021	Total Emissions (millions of tons of CO_2) 2021	Vulnerability and Climate Adaptiveness 2022 Notre Dame Gain Index Rank (of 182 countries)
Brunei Darussalam	23.5	10.5	37
Cambodia	1.1	19.0	149
Indonesia	2.3	619.3	100
Lao PDR	2.8	20.8	137
Malaysia	7.6	256.0	49
Myanmar	0.7	36.3	156
Philippines	1.3	144.3	113
Singapore	5.5	32.5	6
Thailand	3.9	278.5	68
Viet Nam	3.3	326.0	97
World average	**4.7**	–	**91**

ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People's Democratic Republic.

Sources: Our World in Data CO2 Emissions; Notre Dame Adaptation Initiative Index 2022. (accessed 21 July 2023).

Countries within the ASEAN region are strongly committed to implement mitigation measures, as reflected in their Nationally Determined Contributions (NDCs), which are mandatory, and long-term low greenhouse gas emissions development strategies, also called long-term strategies. While the mitigation agenda is getting a lot of attention, the focus given to long-term adaptation remains insufficient. Data on the finalized national adaptation plans (NAP) submitted to the United Nations

Framework Convention on Climate Change (UNFCCC) indicate that in ASEAN only Cambodia has submitted its final NAP in line with the UNFCCC standard (UNFCCC 2012). The absence of a UNFCCC submitted NAP does not necessarily mean that a country neglects adaptation measures, but it tends to suggest the country could further strengthen its institutional process to design and implement long-term and integrated adaptation measures as core policies to support its development pathway and in line with the Conference of the Parties' (COP) multilateral standard (Table 5.2).

Some ASEAN countries are already putting in place many adaptation measures to build country resilience. For instance, Indonesia developed its own National Action Plan for Climate Change Adaptation in 2019. The process was led by the Ministry of National Development Planning and built a strong rationale explaining why adaptation is critical. The strategic document identifies four critical sectors where climate change adaptation will be implemented: agriculture, marine and coastal, health, and water. The document lays out four groups of adaptation actions including technology, governance, infrastructure, and capacity building and spotlights key adaptation programs and policy mechanisms to support the strategy. This is a good practice, but some other ASEAN countries are less advanced in terms of developing a national approach for building climate resilience.

Finally, while ASEAN countries are committed to climate action, cases of maladaptation in Southeast Asia exist in the literature and refer to situations where there is tension between climate goals and development objectives, which can lead to inadequate strategic investments. In an example focusing on an irrigation project in Cambodia, factors accelerating such adverse outcome include conflicts among poor farmers, informality, and inadequate conventional development approaches (Work et al. 2019).

Table 5.2: Nationally Determined Contributions, Long-term Strategies, and National Adaptation Plans in ASEAN Countries

	Nationally Determined Contributions		Long-term Strategies Low Emissions Development Pathways	National Adaptation Plans Submitted to UNFCCC
	Mitigation	Adaptation		
Brunei Darussalam	✓	✓		
Cambodia	✓	✓	✓	✓
Indonesia	✓	✓	✓	
Lao PDR	✓	✓		
Malaysia	✓	✓		
Myanmar	✓	✓		
Philippines	✓	✓		
Singapore	✓	✓	✓	
Thailand	✓	✓	✓	
Viet Nam	✓	✓		

ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People's Democratic Republic, UNFCCC = United Nations Framework on Convention on Climate Change.

Source: Author based on UNFCCC portal (accessed 21 July 2023).

5.3 Toolbox to Support Smart Adaptation and Ensure Mitigation Strategies are Climate Resilient

This section presents a broad framework with several instruments, actionable at diverse stages and for several scopes, which complement each other to support climate adaptation and resilience. In driving Southeast Asia's low-carbon economy, ASEAN countries' policy makers can rely on several tools when they plan their national and local climate strategies and policies, build a pipeline of projects, and oversee project preparation and implementation. Overall, implementing a holistic approach and engaging with all stakeholders including the private sector and civil society, is critical to ensure all views are captured and to capitalize on local knowledge to maximize the understanding of benefits and support effective adaptation solutions.

5.3.1 Building Country Climate Risk Awareness

Adaptation strategies are not one-size-fit-all remedies and cannot be applied regardless of the country context. Therefore, understanding the climate risks of a country is critical to design a strategic plan with solutions. Climate risks faced by a country are the result of (i) hazards faced by the country such as extreme weather events like heat waves, tropical storms, floods, and droughts, (ii) a country's vulnerability, which is the propensity of a system to be adversely affected by hazards, and (iii) the country's exposure, which refers to assets and populations impacted by hazard events.

There are several methodologies for assessing country climate risks. A review of the approaches recommended by the UNFCCC (Downing and Patwardhan n.d.) and some development finance institutions such as the Asian Development Bank (ADB 2014a; Watkiss, Wilby, and Rodgers 2020) show that such an assessment should include the following steps:

- Define the objective of the assessment and scope. This step identifies key questions for guiding the assessment. It generally involves a desk review of existing analysis and strategic documents and assesses climate hazards faced by the country (frequency and magnitude of past hazard events) as well as climate stressors.
- Identify the elements affected by hazard events such as communities, institutions, and locations.
- Understand the vulnerability of the country with an analysis of the country's capacity to cope and adapt to a hazard event. This step leads to a set of vulnerability indicators that describe the state (and diversity) of vulnerability across key stakeholders.
- Undertake a dynamic analysis to lay out key processes where climate hazards impact social and economic indicators and identify potential solutions to prevent adverse effects in the short and long run.
- Identify the drivers of vulnerability and building of scenarios. This step should help to understand the resilient pathways and conditions of maladaptation.
- Identify the policy options in view of adaptation measures at the national level.

Climate risk assessments can be undertaken also at the regional/local, sectoral, and operational level, when projects have to be climate proofed or when more transformational projects supporting adaptation are developed (Section 5.3.3). In practice, these assessments are increasingly undertaken. However, still in many cases, this important step is skipped because it can either delay the preparation of a project or a policy, it is seen as too expensive or the expertise it requires is too difficult to find, or when the project or policy is not supported by a development finance institution. The roster of experts and methodologies are now much more developed and policy makers should systematically undertake a country climate risk assessment to properly calibrate their actions to support climate resilience.

5.3.2 Planning Adequately

Once climate risk awareness is built, policy makers should develop a sound NAP or a sound adaptation component in their NDCs to list concrete standalone adaptation solutions and adaptation measures supporting mitigation strategies. Such a planning process is critical to clarify the expected role of public and private actors and guide potential investments from the private sector.

In the most recent assessment of NDCs, 80% of countries included an adaptation component in their NDCs and provided information on adaptation-related research, vulnerabilities, adaptation measures, synergies with mitigation and other global frameworks, and evaluation of adaptation. There is some progress in comparison to previous NDCs as countries use quantitative adaptation targets and highlight synergies and co-benefits between adaptation and mitigation (UNCC 2022). Despite this progress, NAPs or strong adaptation components in NDCs are still overlooked and should be further prioritized with clear guiding principles at the national level that can be declined locally to have the potential to build a resilient net-zero transition. This step should include a thorough analysis of the triple dividends potentially generated by adaptation options. The guidelines for the national adaptation plan process (UNFCCC 2012) emphasize that this country-led process should be a continuous, inclusive, participative, and multisector process involving all ministries and relevant stakeholders, and incorporate new knowledge to come up with a consolidated adaptation approach with concrete deliverables. Once the planning is finalized, it is critical to monitor implementation to ensure what has been decided is effectively implemented and integrated into all supporting systems such as budgeting and policy design processes. For ASEAN countries, which face similar climate risks, there would be a value in considering a regional adaptation strategy to strengthen climate resilience.

5.3.3 Managing Project Climate Risks

Low-carbon strategies implemented by countries rely on a set of projects that need to be adapted to climate change to be resilient and support a sustainable mitigation strategy. Once country climate vulnerability is understood and adaptation measures identified at the national, local, or sectoral level, with a good understanding of multiple benefits, managing climate risk at the project level involves three main steps:

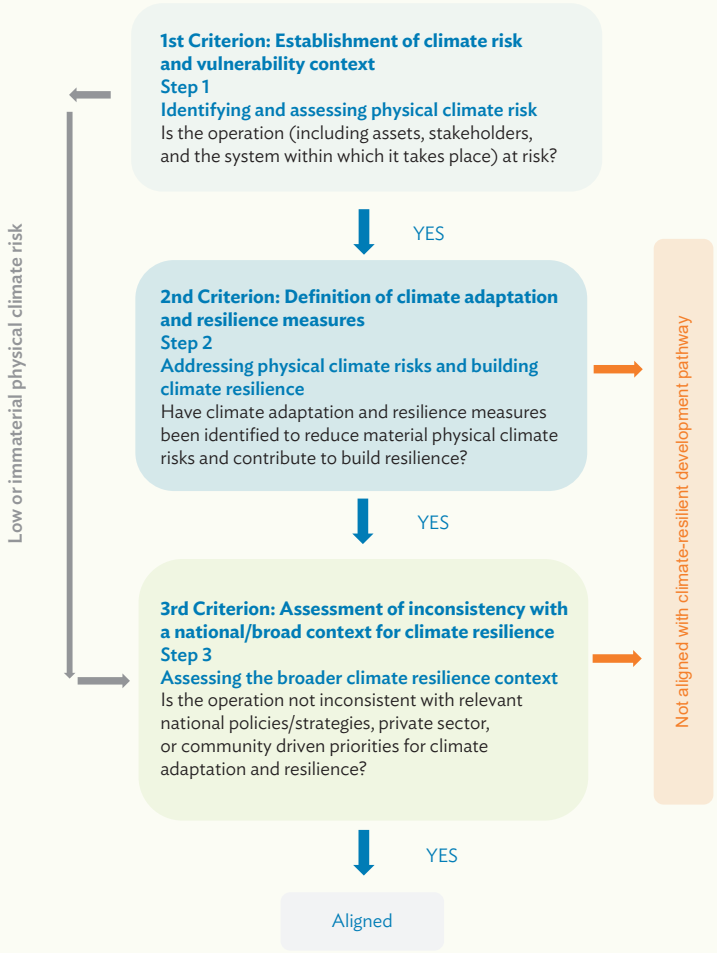
- screening each project to assess its climate risks;
- deeper assessment of risky projects during the project preparation phase to understand their climate vulnerability; and
- estimation of the triple dividend of adaptation options that can be integrated into the project design with a cost-benefit ratio and feasibility studies.

This last step discusses which measures can be more easily implemented with the existing resources (equipment, human resources, budget, geographical constraint, business environment, institutions, etc.). The cost-benefit analysis quantifies and compares the benefits and cost of options with a scenario where there is no adaptation measure and a scenario where the adaptation measure is implemented. The more comprehensive a country climate risk assessment is, the easier it will be to manage the project climate risk. In some cases, it may be more relevant to replace an incremental approach to climate proof a project with a more transformational solution that would be better adapted to climate risks faced by the community and the ecosystem of the project.

5.3.4 Building on Development Finance Institutions' Paris Alignment Processes and Advice

To support countries in meeting their Paris Agreement commitments, development finance institutions (see Clark et al. 2019), including multilateral development banks (MDBs) (MDBs 2018) and bilateral institutions, have built the concept of Paris Agreement alignment to ensure projects they finance are in line with what countries committed to in the Paris Agreement. This framework consists of six building blocks and translates into several methodologies (e.g., joint MDB alignment approach to Paris Agreement, common MDB assessment methodologies, recommendations for the members of the International Development Finance Club). Such a framework is decisive to ensure the support from financing institutions provides adequate advice and sets up the right incentives to implement ambitious climate actions. In this chapter, we argue that this framework can also be used by countries regardless of whether they are supported by a development finance institution, because it provides a structured approach to guide effectively national strategies and investment decisions in line with the climate proofing approach for projects.

Figure 5.2: Evaluation of the Extent to which an Investment is Aligned with the Paris Agreement's Climate Change Adaptation and Resilience Goals



Source: Joint MDB Assessment Framework for Paris Alignment for Direct Investment Operations (2021). https://www.eib.org/attachments/documents/cop26-mdb-paris-alignment-note-en.pdf

Overall, an operation needs to be aligned with both mitigation (building block 1) and adaptation and resilience (building block 2) parts of the framework to be considered "Paris-aligned." Under the existing frameworks, there are exclusion lists, and a multivariable assessment can be undertaken for borderline cases. Under building block 2, to be validated, an operation has to be consistent with a country's climate-resilient development pathways, and compatible with the adaptation and resilience goals of the Paris Agreement. As an example, Figure 5.2 presents the analytical process implemented by MDBs. It includes a three-step process where the following items are assessed: (i) the climate risk and vulnerability context of the project to identify physical risk on the operation, (ii) the integration of climate adaptation and resilience measures into the project design, and (iii) the potential inconsistency of the project with relevant and applicable policies or strategies for climate resilience are assessed. An investment supporting the net-zero transition and exposed to a certain number of identified climate risks that can materially affect project performance is expected to reduce all identified risks as much as possible. Using such a framework will help countries achieve and even increase their Paris Agreement commitments, while charting a fair and equitable path to net-zero and climate-resilient development.

5.3.5 Strengthening Capacity of all Relevant Stakeholders and Disseminating Knowledge

Another critical ingredient policy makers should consider refers to information asymmetries. In many instances, adaptation measures are not considered either because the climate risk is underestimated, is seen as too uncertain or too long term, or because solutions are perceived as expensive or are simply unknown. This applies to public and private investments. Filling this knowledge gap through capacity building will improve the understanding of the climate emergency and facilitate the preparation of Paris-aligned strategies and pipelines.

Transition taxonomies have been developed and are now robust and well known. The ASEAN taxonomy for sustainable finance is a good practice and serves as a standardized interoperable system for the ASEAN countries to have a coordinated approach on labeling of economic activities and financial instruments. This is critical to drive transition to a low-carbon economy. Similar systems have been created for adaptation and provide examples of international good practices to disseminate technologies and solutions across sectors to support climate resilience (see e.g., Trabacchi et al. 2020; Climate Adapt portal; UNFCCC portal; ADB 2014b; GTC and UNEP DTU 2020). Policy makers should tap these resources to learn from existing practices and integrate existing solutions in line with the context of their scope of action.

5.4 Conclusion

This chapter argues that it is critical to include ambitious adaptation solutions into climate country responses and integrate adaptation measures along mitigation measures to build resilient low-carbon economies. It provides a toolbox to guide policy makers in shaping holistic solutions at the upstream level when a country's climate strategies are designed or reviewed, at the midstream level when the climate national approach is translated into budget processes and investment plans, and at the downstream level when projects are prepared and implemented. While development finance institutions, such as the Asian Development Bank, are critical agents of change to support countries in implementing their climate actions, these tools are increasingly accessible directly to policy makers. Such informed comprehensive approaches, implemented both nationally and locally, will drive sustainable low-carbon economies in Southeast Asia.

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CHAPTER 6

Promoting Sustainable Finance and Financial Stability Through Climate-Related Corporate Disclosure in Asia

Sayuri Shirai

6.1 Introduction, Facts, and Basic Concepts

Many countries and companies in the world are increasingly concerned that global warming and associated hazards have already begun to cause substantial social and economic damages and losses in many economies and regions and will have even greater adverse impacts in the future. In 2015, therefore, nearly 200 economies reached the Paris Agreement—a legally binding international treaty on climate change of holding the global average temperature increase to well below 2°C or pursuing efforts to limit the temperature rise to 1.5°C above pre-industrial levels (1850–1900) by the end of the century. These committed countries have since submitted Nationally Determined Contributions (NDCs) including the 2030 GHG targets to the United Nations Framework Convention on Climate Change by 2020 and are expected to resubmit more ambitious climate plans every 5 years thereafter to reach the Paris Agreement goals. Most of these economies have also set long-term net-zero GHG emissions targets—roughly equivalent to carbon neutral target—to be achieved by 2050 or a little after some EMDEs by taking necessary climate policies.

Information about business activities concerning climate issues based on an accountable and high-quality disclosure and reporting system is a critical tool for the government and the financial sector in being informed, tracking, and governing climate-associated risks of the economies. This in turn enables businesses and the country to utilize actual and potential opportunities that the decarbonization process will offer in the short, medium, and long term. This is because the disclosure allows each company and sector to understand how climate risks are affecting their activities and strategies and how the prospects of sustainable and climate-friendly business and society will change the viability of their activities. These processes will ultimately help develop sustainable finance, which will accelerate a reallocation of investment capital toward low carbonization and decarbonization projects and reduce serious associated investment gaps. These gaps are substantially large for emerging and developing economies (EMDEs) where access to affordable climate finance is limited and thus it is important to start with promoting their understanding about climate risks and associated financial risks through introducing a disclosure and reporting system in a phased manner.

6.1.1 Discrepancy in GHG Emissions Targets and Actual Practices

Since the Paris Agreement, the IPCC released the 1.5°C special report and stressed the importance of keeping global warming to 1.5°C by the end of the 21st century (2100) as the severity of climate changes and impact on economies and societies will be much greater under the 2°C scenario relative the 1.5°C scenario (IPCC 2018). GHG emissions from human economic activities and associated burning of fossil fuels over the period of more than a century have already led to global warming of 1.1°C in 2011–2020 above pre-industrial levels (around 1850–1900). Thus, maintaining the global average temperature to 1.5°C by the end of this century requires more comprehensive and active climate policy measures and industrial and corporate actions. Five years later in 2023, in the Synthesis Report of the Sixth Assessment Report (the AR6 Report), the IPCC gave a strong warning that not only the 2030 global GHG emissions targets set by the NDCs are insufficient, but also the pace and scale of climate mitigation policies undertaken so far are inadequate to tackle

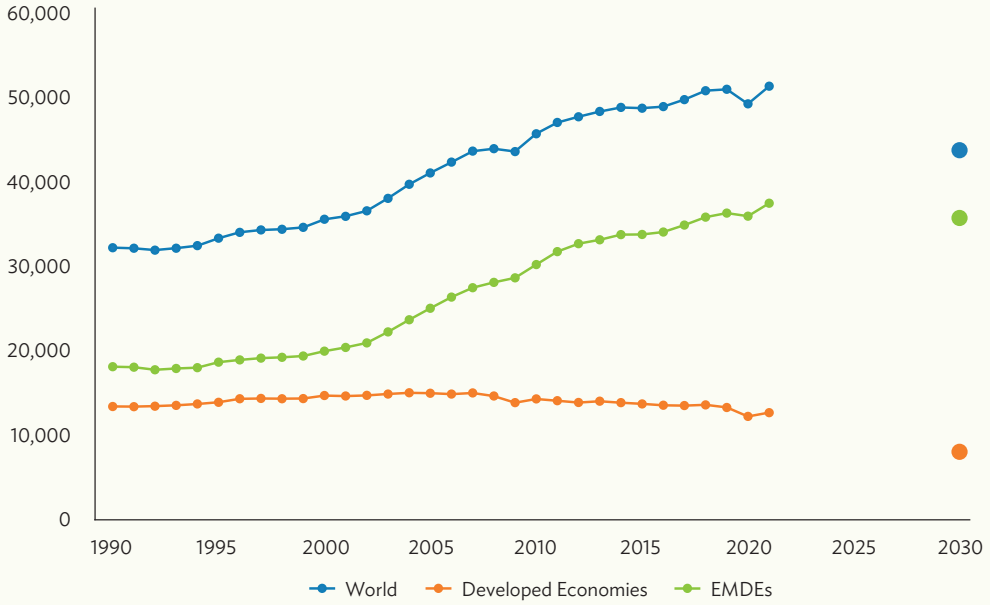
climate change. This will significantly increase the challenge of limiting global warming to well below 2°C, not to mention the feasibility of approaching the 1.5°C target (IPCC 2023). As the increase in GHG emissions is accelerating global warming and even the prospect of keeping the global temperature below 2°C is becoming distant, the IPCC called for deeper, more rapid, and sustained reductions in GHG emissions in all sectors.

Figure 6.1a indicates the annual GHG emissions of the world, developed economies, EMDEs, and Southeast Asia from 1990 to 2021, as well as their NDC emissions targets set for around 2030. The data refer to actual total GHG emissions, excluding land use, land-use change, and forestry and the 2030 targets. While developed economies emit a smaller amount of GHG emissions and indicate declining trends, it should be acknowledged that their accumulated GHG emissions using fossil fuels since their industrialization over the period of more than a century have been substantial. Thus, there is a consensus that advanced economies, which have already industrialized and thus achieved higher levels of per capita income, should be more responsible for reducing GHG emissions than EMDEs although EMDEs should also make efforts to cut their current emissions. To meet the NDCs, the world needs to reduce GHG emissions to 80% of todays' emissions level (i.e., latest 2021 level). To fulfil the 2030 targets, developed economies must cut emissions to 64% of today's emissions level by reducing emissions at an average annual rate of 4.5% between 2022 and 2030. Meanwhile, EMDEs' emissions must be reduced to 95% of today's emissions level to meet the 2030 targets by cutting emissions at an average annual rate of 0.6%.

Developed economies have been facing sluggish potential economic growth rates due to aging and/or declining populations and a shift in their industrial structures toward services (such as health and social services, finance, professional services, entertainment, and retail/wholesale trade). Developed economies are equipped with higher levels of knowledge and skills, capital stock, and a well-developed financial sector and systems. The amount of their investment in clean energy has been rising. These favorable factors have been associated with a decline in GHG emissions (Figure 6.1a). Much more effort has to be made by developed economies to cut emissions rapidly to fulfill the 2030 targets and revise them to more desirable, ambitious targets given that more than a century of GHG emissions have been generated by industrial and economic activities in these countries.

In contrast, EMDEs, in particularly those in Asia, will continue to face higher economic and population growth in the future than developed economies. This will require substantial energy supply in response to anticipated energy demand. Thus, holding GHG emissions to the 2030 emissions level pledged under the NDCs is a challenging task for EMDEs given that many existing energy-related facilities are carbon-intensive and many coal-fired power plants are relatively new (average 14 years) related to around 45 years in the United States and Europe (Figure 6.1b). Thus, Asia has to adopt measures to reduce emissions from those facilities by replacing existing facilities, while new energy investment should be increasingly concentrated in low-carbon or clean energy industries. While EMDEs also have to take more climate policy actions to meet their 2030 emissions targets, low-income countries with high debt levels need to obtain support from developed economies and the international community to meet the Paris Agreement goals.

Figure 6.1a: GHG Emissions and NDCs
(million metric tons of CO_2 equivalent)

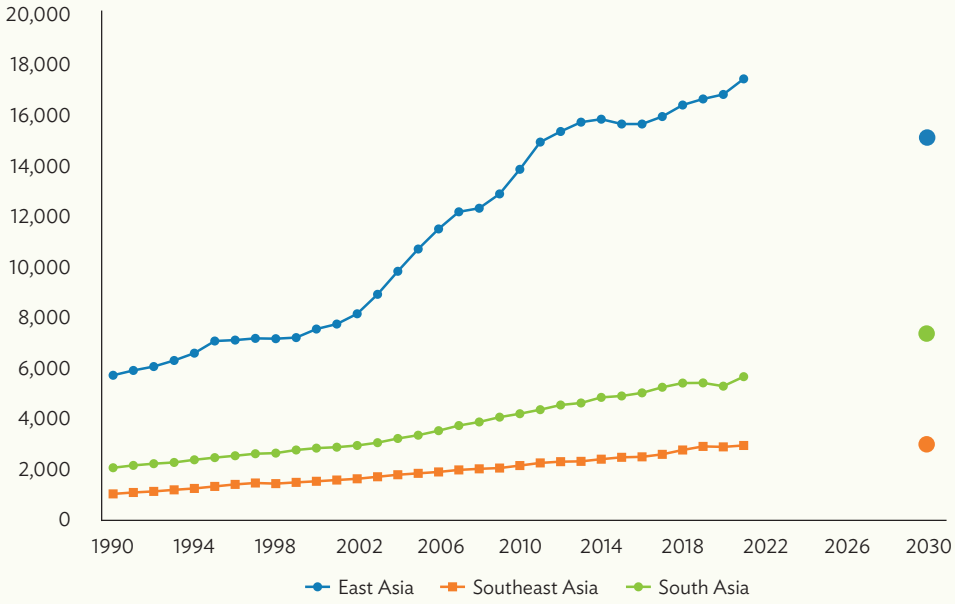


EMDEs = emerging and developing economies, GHG = greenhouse gas, NDCs = Nationally Determined Contributions.

Note: Data refer to total GHG emissions, excluding land use, land-use change and forestry. Dot in the figure refers to the Nationally Determined Contributions.

Source: Prepared by the author based on the International Monetary Fund's Climate Change Dashboard.

Figure 6.1b: GHG Emissions and NDCs
(million metric tons of CO_2 equivalent)



GHG = greenhouse gas, NDCs = Nationally Determined Contributions.

Note: Data refer to total GHG emissions, excluding land use, land-use change and forestry. Dot in the figure refers to the Nationally Determined Contributions.

Source: Prepared by the author based on the International Monetary Fund's Climate Change Dashboard.

6.1.2 Physical Risks, Transition Risks, and Associated Legal Risks

Given the pace of global warming is accelerating more than expected, it is important to deepen understanding of climate risks. It is now widely understood that there are two types of climate change risks to global economies and societies: physical risks and transition risks.

As for physical risks, they are already increasingly exerting adverse impacts and damage on economic and social activities and lives through extreme weather conditions. It is expected that such risks will materialize more frequently and extensively, generating more significant damage and food and water shortages in the near future in many parts of the world. Physical risks are related to higher frequency and severity of acute events (e.g., severe and prolonged draughts, heatwaves, wildfires, precipitation, cyclones, typhoon, hurricanes) and to chronic events (e.g., sustained rising temperature, rising sea level, changing precipitation patterns). While the frequency and the scale of climate change-driven natural hazards will be greater as global warming progresses, the occurrence of such events will likely happen nonlinearly. Governments could cope with physical risks through climate adoption policies to enhance resilience to the current and future impacts of climate change. Such policies include building climate resilient infrastructure, making land use and water management planning more effectively to cope with physical risks, promoting agricultural practices more resilient to climate event, and protecting ecosystems and natural stock that could possibly provide natural protection against physical risks.

Meanwhile, economies and companies will face transition risks as governments adopt more rigorous climate mitigation polices aimed at preventing or reducing GHG emissions into the atmosphere in line with the Paris Agreement goals. Transition risks tend to materialize in the process of adjusting the economy and society toward carbon neutrality. Mitigation measures include carbon pricing (carbon tax and emissions trading system); increase in renewable energy supply (such as solar power, wind power, hydro power, geothermal energy), research and development to promote renewable energy, batteries and storage, and other low-carbon or decarbonization technology through tax incentives and subsidies; phasing out subsidies supporting fossil fuel industries; low-emissions public investment, as well as regulations related to emissions limits and energy efficiency. Private-sector initiatives to develop low-carbon technology and production methods, as well as a shift in consumer preferences and market sentiments toward clean energy sources and products will also accelerate the transition of the economy toward carbon neutrality and thus contribute to transition risks. Thanks to technology development, the prices of renewable energy are dropping and thus help to facilitate transition.

Transition risks are related to those that will drive corporate and sectoral restructuring and an increase in stranded assets. In particular, companies and financial institutions should pay attention to the possibility of incurring stranded assets related to carbon-intensive assets (including production equipment, facilities, and fossil fuel reserves). These assets are likely to generate losses because investment cost cannot be fully recovered as expected future carbon pricing or tighter environmental regulation will turn them obsolete and economically unviable in the transition process. To accelerate climate mitigation policy actions smoothly, governments should ensure the process is inclusive by taking into account the distributional outcomes including adverse impact on some communities and their workers heavily depending on carbon-intensive industries (just transition mechanisms). Although the net impact of reducing GHG emissions and facing transition risks will be substantially positive, just transition mechanisms should minimize disturbances by supporting communities and their workers to shift into new industries. Transition risks could also be related to increased national protectionism in the face of rising demand for precious metals and natural resources used for renewable energy and low carbon transportation. In addition, some regions may opt for divergent climate-related trade policies including the carbon borders adjustment policy. These factors can affect heavily EMDEs, particularly export-oriented countries in Asia.

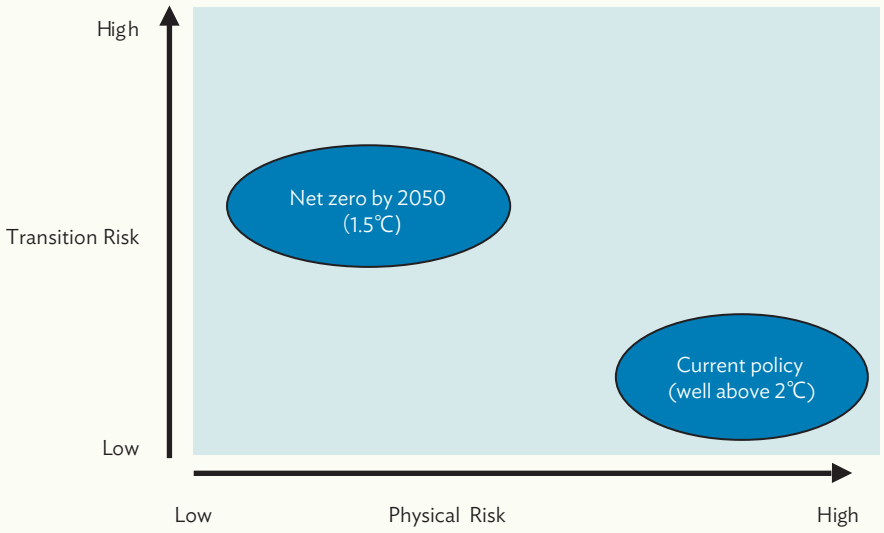
Governments and companies also need to enhance awareness of climate-related litigation risks (liability risks). With regard to physical risks, lawsuits are more likely to occur in the future if plaintiffs or victims of natural disasters can provide scientific evidence that GHG emissions-intensive companies are directly responsible for extreme natural disaster events and the resultant losses. Governments and companies should also recognize that lawsuits challenging insufficient climate change mitigation policies and measures, as well as the payment of penalties and compensation will increase in the transition process as part of transition risks. For example, governments and emissions-intensive companies that officially set time-bound carbon neutral targets might be sued by civil society, including nongovernment organizations, if their actions are inconsistent with the official GHG emissions targets. When companies advertise and use labels that their products and services are environmentally friendly, caution is needed to ensure that their contents are not viewed as greenwashing practices. Consumers that believe that they were misled by such advertisements and labels may sue the companies. Indeed, there is a growing number of lawsuits or punishments against companies violating environmental regulations. According to Norton Rose Fulbright, a global law firm, the total number of climate change cases filed globally as of September 2022 reached 2,419, up from about 1,890 in February 2022. Among these cases, there were 858 cases in the United States, 244 cases in Europe, and 126 cases in Australia (de Wit and Stebbing 2022). Governments and companies may lose reputation and companies may also lose customers and investors.

6.1.3 Inverse Relationships between Physical Risks and Transition Risks

Physical risks and transition risks are known to be inversely related (Figure 6.2). Unless necessary climate policies are adopted in a timely manner by governments across the globe, transition risks remain low, but instead physical risks will increase significantly over time. As a result, the global average temperature could rise to well above 2°C from the pre-industrial levels by the end of this century or even much sooner as pointed out above. To avoid this excessive global warming, collective global efforts must be made to limit the increase in the global average temperature to 1.5°C or at least well below 2°C by the end of this century in concordance with the 2015 Paris Agreement.

The IPCC's AR6 Synthesis Report emphasized that, global GHG emissions must peak before 2025 and be reduced by 43% by 2030 and by 60% 2035 relative to the 2019 level in order to limit global warming to about 1.5°C (IPCC 2023). As some residual GHG emissions remain due to the presence of hard-to-abate manufacturing, aviation, and agricultural sectors, those emissions should be offset by using carbon dioxide removal methods including afforestation and reforestation, direct air capture, and bioenergy with carbon capture and storage. Although many countries are reluctant to implement climate policies in fear of transition risks, it is desirable to start policy actions to reduce GHG emissions as soon as possible. The sooner the necessary climate mitigation policies are adopted, the smoother the transition process will be since governments, companies, and individuals will have more time to adjust. As a result, the transition risks will be lower compared with those in the case of delaying necessary actions now and thus finding it inevitable to adopt the policies later at a greater speed and with more drastic content.

Figure 6.2: Relationships Between Physical Risks and Transition Risks



Source: Prepared by the author.

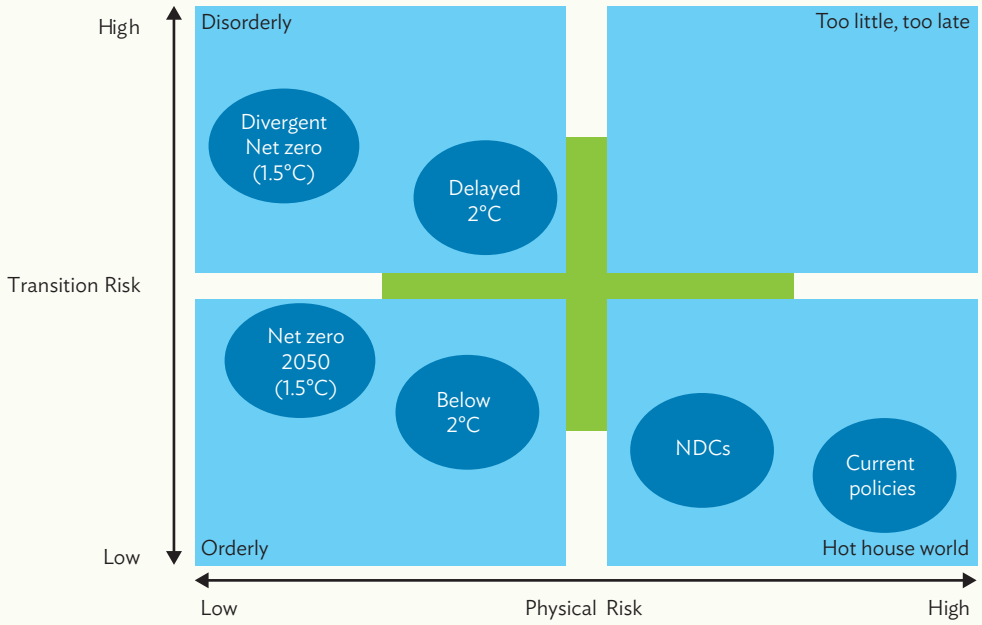
6.1.4 Evolution of Physical Risks and Transition Risks Under Climate Scenarios

One way to understand the relationships between physical risks and transition risks is to examine the possible outcomes envisaged under various long-term climate scenarios (the time span generally extending up to around 2050). The climate scenarios have been developed by several international organizations such as the IPCC and International Energy Agency (IEA) to assess the possible impacts of climate change by generating possible future path of GHG emissions and associated global average temperature. Based on the assumptions related to policy options (such as carbon pricing and other climate policies), energy use and systems, and technology development, for example, the IEA provide three major climate scenarios. These are (i) sustainable development scenarios (SDS) that enable to limit the global average temperature to well below 2°C; (ii) the more ambitious net-zero emissions by 2050 scenario leading to global net-zero GHG emissions by 2050 and limiting global average temperature to 1.5°C by the end of this century; and (iii) the stated policies scenario (STEPS**)** that consider the current climate policies around the world and thus not consistent with the Paris Agreement goal as a result of leading to a global average temperature rise to well above 2°C. Physical risks under the STEPS will be higher than those under the two other scenarios. Transition risks under the net-zero emissions by 2050 scenario will require more rigorous climate policies.

Climate scenarios have also been developed by the Network of Central Banks and Supervisors on Greening the Financial System, which comprises more than 100 central banks and financial supervisors (NGFS 2022). These scenarios are developed for the purpose of being used by financial authorities in performing bottom-up climate scenario analysis for financial institutions (such as banks and insurance companies) in their jurisdictions. The six types of climate scenarios can be decomposed into (i) orderly scenarios (net-zero [1.5°C] scenario and below 2°C scenario), (ii) disorderly scenarios (delayed 2°C scenario and divergent net-zero scenario), and (iii) hot house world scenarios (NDCs) scenario and current policies scenario). Transition risks are higher but physical risks are lower under the orderly

scenarios while transition risks are limited but physical risks are much higher under the hot house world scenario (Figure 6.3). The main scenarios are the net-zero emissions scenario, the delayed 2°C scenario, and the current policies scenario. More than 30 jurisdictions have been implementing climate scenario analysis. Financial authorities use these scenarios by adding country- or regional-specific factors. Such analysis helps financial authorities to examine the potential impact on financial institutions and financial system under various climate scenarios. Financial authorities could use these exercises to promote financial institutions' awareness about potential deficiencies in their climate risk management framework, leading to improvement of their risk management practices (see Section 6.3).

Figure 6.3: NGFS Six Types of Climate Scenarios



NDCs = Nationally Determined Contributions, NGFS = Network of Central Banks and Supervisors on Greening the Financial System.

Source: NGFS (2022).

6.1.5 Need to Reduce Investment Gaps

The IEA projects that global investment in clean energy (clean electrification, energy efficiency, low-emission fuels) needs to increase from current around $1.6 trillion in 2022 to about $4.6 trillion in real terms by 2030 under the net-zero GHG emissions by 2050 scenario (IEA 2023). It is clear that developed countries need to take the lead in investment in clean energy and other sectors (including agriculture) and promote further cuts in GHG emissions. Meanwhile, the world should pay more attention to EMDEs to cut GHG emissions in the near future given that about 775 million people lack access to electricity and 2.4 billion people lack access to clean cooking fuels (IEA and IFC 2023).

Under the aforementioned IEA's STEPS leading to a global average temperature rise to well above 2°C, it is estimated that one-third of the rise in energy use in EMDEs over the next 10 years would be met by fossil fuels (IEA and IFC 2023). To prevent this scenario and enable these countries to benefit

from clean energy technologies and GHG emissions cuts, the issue of how to mobilize more finance and investment must be examined urgently. At present, around $770 billion is invested annually in clean energy in EMDEs in 2022, but most of this investment is concentrated in a few large emerging economies such as the People's Republic of China (PRC), India, and Brazil. In particular, the PRC accounts for two-thirds of this total investment (about $511 billion). To meet the Paris Agreement goals, EMDEs need to make annual (public and private) investment in clean energy more than triple from the current $770 billion to $2.2 trillion under the SDS and $2.8 trillion under the net-zero emissions by 2050 scenario by 2031–2035 and maintaining similar amounts up to 2050 (Table 6.1). Excluding the PRC, the amount of investment needs to rise more sharpy, about sevenfold from the current $260 billion to around $1.4 trillion under the SDS and $1.9 trillion under the net-zero emissions by 2050 scenario. To mobilize these levels of investment, expanding private funds through blended finance schemes is necessary (Shirai 2023).

Table 6.1: Actual and Estimated Annual Clean Energy Investment ($ billion)

	2015	2022	Sustainable Development Scenario			Net-Zero Emissions by 2050 Scenario		
			(1) 2026-2030	(2) 2031-2035	(2)/2020 level	(1) 2026-2030	(2) 2031-2035	(2)/2020 level
EMDEs	538	773	1,784	2,219	3	2,222	2,805	4
People's Republic of China (PRC)	287	511	730	850	2	853	947	2
EMDEs excluding PRC	251	262	1,054	1,369	5	1,369	1,858	7
Southeast Asia	28	30	171	208	7	185	244	8
India and Other Asia	76	82	321	418	5	348	467	6
Africa	26	32	160	207	6	203	265	8
Latin America	63	66	150	209	3	243	332	5
Middle East and Eurasia	57	52	223	303	6	390	550	11

EMDEs = emerging and developing economies.

Note: The sum of regional data does not add up to total amount due to rounding.

Source: Prepared by the author based on IEA and IFC (2023).

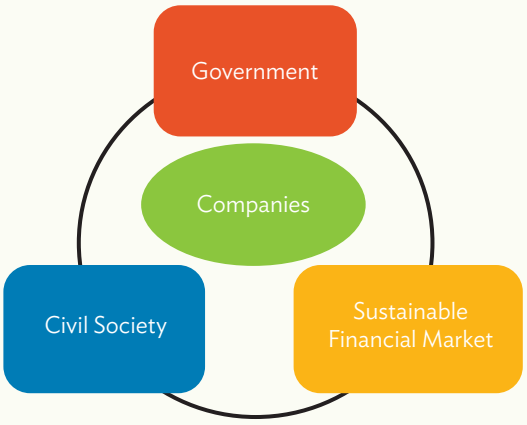
6.2 Promoting Firm-Level Climate-Related Disclosure

To achieve the Paris Agreement goals, economic and business activities need to be reconsidered in terms of their contribution to GHG emissions. According to the World Resource Institute, energy accounts for about 75% of total GHG emissions. Among energy driven GHG emissions, electricity and heat account for about 40%, followed by transportation (19%), and manufacturing and construction (8%). This suggests that emissions from electricity and heat must be cut substantially by shifting from fossil fuel energy to renewable energy and other low-emission fuels and utilizing heat pumps. The transport sector can reduce emissions by increasing the number of electric vehicles. The manufacturing sector can do so by promoting energy efficacy, developing new low-carbon technology, using renewable energy and low carbon fuels, and investing in carbon, capture, utilization, storage technology. These changes require substantial transformation in the industrial structures and corporate business models. To accelerate the transition process, corporate disclosure is essential for governments to provide necessary support and for investors to prove more funds to essential projects.

6.2.1 Coordination Among the Three Entities

To achieve the 2030 GHG emissions targets and net-zero GHG emissions by around 2050, each country needs to transform industries and companies toward more environmentally sustainable and low carbon-intensive activities. To materialize this smoothly, the following three entities—the public sector, sustainable finance, and civil society—need to function smoothly. The public sector includes central and local governments, financial regulators, and central banks. Sustainable finance comprises banks, investors, banks, and other financial institutions, as well as the financial sector and systems as a whole. Civil society includes nongovernment organizations, think tanks, universities, and individuals. Each entity should act more proactively to help transform corporate activities and make their businesses more environmentally sustainable (Figure 6.4).

Figure 6.4: Three Entities in Achieving Net-Zero Emissions



Source: Prepared by the author.

Among the three entities, governments play the most important role in implementing climate policies. They include fiscal policy and regulatory tools—such as carbon pricing, public investment, research and development subsidies and tax incentives, and environmental regulations—to encourage innovation and investment by the private sector. The pace of adopting specific climate policy measures will greatly affect the speed of transitioning the economy toward carbon neutrality and resultant future global warming. Within their existing mandates, central banks could assess the effects of climate risks on financial systems and central bank operations. Together with financial supervisors, central banks could help remediate financial market mispricing and promote sustainable finance.

As the second essential entity, sustainable finance is essential to support environmentally sustainable activities of governments, companies, individuals, and other stakeholders. Financial institutions should pay attention to financed emissions and associated climate-related financial risks. By understanding such risks, they are encouraged to allocate more funds to companies engaging in decarbonization and low carbon projects and new technology. By transforming their business models to become more sustainable, financial institutions play an important role in fostering sustainable finance and accelerating the pace of transition of the economy toward carbon neutrality. As the third, equally important entity, civil society plays an essential role in encouraging more environmentally sustainable actions among governments,

financial institutions, businesses, and individuals by monitoring their activities and calling for more actions. Education and dissemination of information to promote understanding of climate risks and policies among the general public is also necessary to generate support for climate policies and cope with transition risks. To promote effective actions among the three entities, government efforts to improve corporate disclosure in collaboration with stock exchanges setting listing requirements are crucial, as mentioned below.

6.2.2 Promoting Climate-Related Disclosure Based on TCFD Recommendations

The world needs to increase investment in clean energy and low-carbon technology in order to meet their 2030 GHG emissions targets, as shown in Figure 6.1a, and accelerate the path toward carbon neutrality by 2050. Also, Table 6.1 indicates estimates on the annual amount of clean investment necessary to achieve the Paris Agreement goals. Many of these investment activities are expected to be undertaken by companies in the form of projects. Given that the scale of these investment is substantial, the mobilization of private-sector finance is crucial. For this to take place at scale, it is necessary for investors and financial institutions to allocate more funds to these activities.

Thus, promoting climate-related corporate disclosure is essential for investors and financial institutions to assess companies and their activities and make proper financing decision. As companies increasingly face physical risks, transition risks, and associated litigation risks (liability risks), financial institutions including banks and investors financing those companies will face potential losses. They have to understand that their loans and investments provided to emissions-intensive companies may become nonperforming in the future if those companies find it difficult to recover the costs of fixed asset investment—thus, making those assets stranded and lowering companies' repayment capacity and returns. If there are many financial institutions that finance such industries and companies, there is a risk that the stability of the financial system will be threatened.

Given this background, the Task Force on Climate-related Financial Disclosure (TCFD) was created by the Financial Stability Board (FSB) in 2015 in response to the Group of Twenty (G20) decision that recommended organizations and companies disclose climate-related financial information. This initiative was formed to help correct market failure that hampers appropriate pricing of climate risks and thus result in inefficient financial allocation. To correct market failure, financial institutions and investors need more accurate, timely, standardized information. The TCFD recommendations were released in 2017. They are a set of recommendations for the voluntary disclosure of climate change-related financial risks and opportunities. Those were developed in response to a growing demand by investors, lenders, insurance companies, and other stakeholders by providing information useful for their financing decisions. The TCFD recommendations have since been widely accepted by many countries as a basis for climate-related reporting by companies and financial institutions. More than 100 countries and jurisdictions officially support the recommendations. Updated recommendations were released in 2021 (TCFD 2017, 2021).

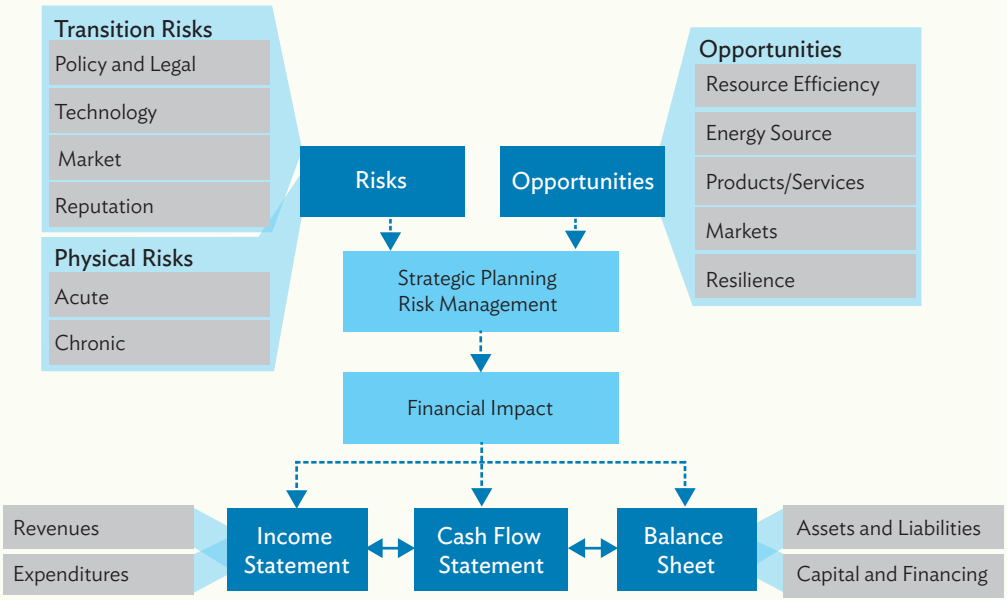
Climate-related Risks and Opportunities: The disclosure framework is based on promoting companies to identify and assess climate-related risks and opportunities that are material to their business operations, as well as disclose them as part of their annual financial reporting process (such as sustainability reports, TCFD reports, integration reports, etc.). Climate change could bring a number of opportunities to corporate businesses. For example, companies could improve efficiency in energy, water, materials, and waste management and reduce operation costs; develop new low-emissions products and services and thus attract new customers and seek new markets and enhance corporate ability to cope with climate change. On the other hand, climate-related risks comprise physical risks and transition risks. Physical risks are decomposed into acute and chronic risks as described

above. Transition risks include (i) policy and regal risks, (ii) technology risk, (iii) market risk, and (iv) reputation risk.

- Policy and regal risks are related to climate policy actions (such as carbon pricing, energy, or water efficiency-enhancing measures, more sustainable land-use) and litigation claims that can be brought before the courts by governments, companies, investors. insurers, nongovernment organizations, and individuals, for example, due to the inaction to mitigate impacts of climate change and insufficient disclosure of climate risks.
- As for technology risk, low carbon technology might result in stranded assets and existing production system no longer viable.
- Market risk might occur when shifts in supply and demand for commodities, products, and services take place.
- Reputation risk is related to a loss of reputation as a result of customers' changes in preference toward low-carbon products and services.

Financial Impacts of Climate-related Risks and Opportunities: Once companies identify climate-related risks and opportunities, possible impacts on corporate income statements (revenue, expenditure), and balance sheets (assets, liabilities) could be examined. Corporate revenue can be affected as climate change influences demand for products and services and carbon pricing raise cost of using fossil fuel energy. Expenditure can be influenced by various physical and transition risks. Companies should look at how those risks and opportunities are likely to impact their revenue and expenditure materially. Various risks and opportunities could affect the valuation of companies' long-lived assets and liabilities. Companies should focus not only on existing assets and committed activities including possible restructuring or impairment of assets, but also on new capital expenditures and research and development leading to new capital stock formation. Internal carbon pricing practice is recommended to see the impact of possible carbon pricing promoted by governments on their future cost of operations. The equity and debt structure can be affected as well if financing conditions change in response to climate risks.

Figure 6.5: Climate-Related Risks, Opportunities, and Financial Impact



Source: TCFD (2017).

6.2.3 Four Pillars of the TCFD Reporting Framework

The TCFD recommendations consist of four pillars: governance, strategy, risk management, and metrics and targets. These four pillars are now becoming global common foundations to disclose corporate sustainability or environment, social, and governance (ESG) information.

- The governance pillar focuses on disclosing the corporate governance structure to cope with climate risks and opportunities including the board supervision and role of the management.
- The strategy pillar describes the "material" climate risks and opportunities identified over the short, medium, and long term and their implications on the business models, strategies, and financial planning. Companies are expected to explicitly disclose actual and potential financial impacts of climate change and transition plans (measures to transform current business operations toward low carbon operations). It also includes the climate scenario analysis including a 2°C or lower scenario in line with the Paris Agreement although a 1.5°C scenario is increasingly expected by ESG investors.
- The risk management pillar describes the process of identifying, assessing, managing, and integrating climate risks into overall risk management.
- The metrics and targets pillar is the most important pillar since indicators and targets can be used by ESG investors and financial institutions to deepen their understanding of the climate-related risks and opportunities of their invested or financed companies. The information is useful for financial institutions and other stakeholders to engage with companies to promote their actions and at the same time to shift funds to more sustainable assets in the investment and loan portfolios by making efforts to align with the Paris Agreement goals.

Regarding GHG remissions, companies are expected to disclose Scope 1 (direct emissions from the company's operations) and Scope 2 (indirect emissions generated from purchased energy) GHG emissions regardless of materiality. While Scope 3 GHG emissions (such as those emitted by suppliers and users) is subject to materiality, companies are encouraged to disclose them. Scope 3 emissions can be decomposed into 15 categories from upstream stages to downstream stages according to the GHG protocol. GHG emissions can be disclosed using both absolute emissions and emissions intensity according to the GHG Protocol (WBCSD and WRI 2004 2011). The world is now increasingly focusing on Scope 3 GHG emissions because they account for about 75% of total GHG emissions (CDP 2022). Without making efforts to disclose Scope 3 emissions data and then cut those emissions, achieving net-zero GHG emissions is not feasible. Also, it is essential to disclose progress against the targets—especially, in relation to GHG emissions targets in the medium and long term. Such companies are also expected to explain how those targets are used to manage their regular climate-related risks and opportunities with regard to allocating funds to investment and research and development activities.

As cross-industry climate-related metric categories, furthermore, companies are encouraged to estimate the amount and extent of assets or business activities vulnerable to transition risks and physical risks, respectively, and disclose each in terms of amount or percentage (related information will be provided below in the context of the ISSB Standards). Climate-related opportunities can also be estimated with regards to associated revenue, assets, or other business activities and disclose then in terms of amount or percentage. Disclosure on capital investment related to climate-related risks and opportunities is also recommended since this information could influence long-term corporate value and thus is important for investors, creditors, and other stakeholders. Information about the use of internal carbon prices (carbon prices on each ton of GHG emissions) used for capital investment plans is also recommended. Some investors and stakeholders find such information essential to find out companies' risk and opportunity assessment and risk management, as well as to assess their vulnerability to future

policy responses and resilience to transition risks. Finally, the proportion of executive management remuneration linked to climate factors (such as progress related to corporate GHG emissions target) is also recommended. Such renumeration could provide incentives for management to make greater efforts to achieve their targets and improve the governance, oversight, and accountability.

6.2.4 ISSB Standards on Climate-Related Disclosures

While TCFD recommendations are increasingly accepted by countries and companies, corporate-level disclosure remains inadequate and tends to be cherry-picking. In particular, disclosure of GHG emissions data and their reduction targets remain highly inadequate. Moreover, there are numerous sustainability reporting standards developed by nongovernment organizations, think tanks, and others. As companies freely pick some of those standards and often follow just part of the selected standards, investors and financial institutions continue to find it difficult to compare the disclosed information across companies, industries, and countries. This has led to a growing call for developing a global standardized corporate disclosure requirement.

Given this background, the ISSB was established by the International Financial Reporting Standards (IFRS) Foundation in November 2021 with strong worldwide support to provide timely, reliable, and comprehensive information on ESG issues. There is a consensus that IFRS Foundation, whose Accounting Standards are already required by more than 140 jurisdictions, is the suitable organization to develop and promote disclosure standards related to climate change and other ESG issues. The ISSB published Sustainability Disclosure Standards, which were decomposed into the General Requirements for Disclosure of Sustainability-related Financial Information (IFRS S1) and Climate-related Disclosure (IFRS S2) in June 2023 after releasing the draft standards 1 year ago and revising them based on feedback derived from public consultation (ISSB 2023a, 2023b). IFRS S1 focuses on the sustainability-related risks and opportunities companies face over the short, medium, and long term, while IFRS S2 focuses on specific climate-related disclosures. Both standards were developed by integrating the TCFD recommendations, the Standards of the Sustainability Accounting Standards Board (SASB), Climate Disclosure Standards Board Framework, Integrated Reporting Framework, and World Economic Forum metrics.

Companies using IFRS disclosure standards will be required to disclose climate-related information from January 2024 (i.e., reporting in 2025) with regard to climate matters of IFRS S1 as well as IFRS S2 for the first year. From the second year, the ISSB requires disclosure of IFRS S1 including sustainability-related risks and opportunities beyond climate-related information. Earlier application is permitted. The adoption of the ISSB Standards by companies is on a voluntary basis, but regulators in each country are expected to make the disclosure mandatory to companies in their jurisdictions possibly with some transition phases. As the objective of developing ISSB Standards is to ensure comparable, reliable, consistent disclosure for investors and stakeholders, disseminating the ISSB Standards to large companies is essential. This would promote confidence of investors and other stakeholders in terms of assessing and monitoring sustainability risks and opportunities of diverse companies with different businesses. Some countries may switch disclosure of climate-related information based on the IFRS 2 rather than that based on the TCFD recommendations.

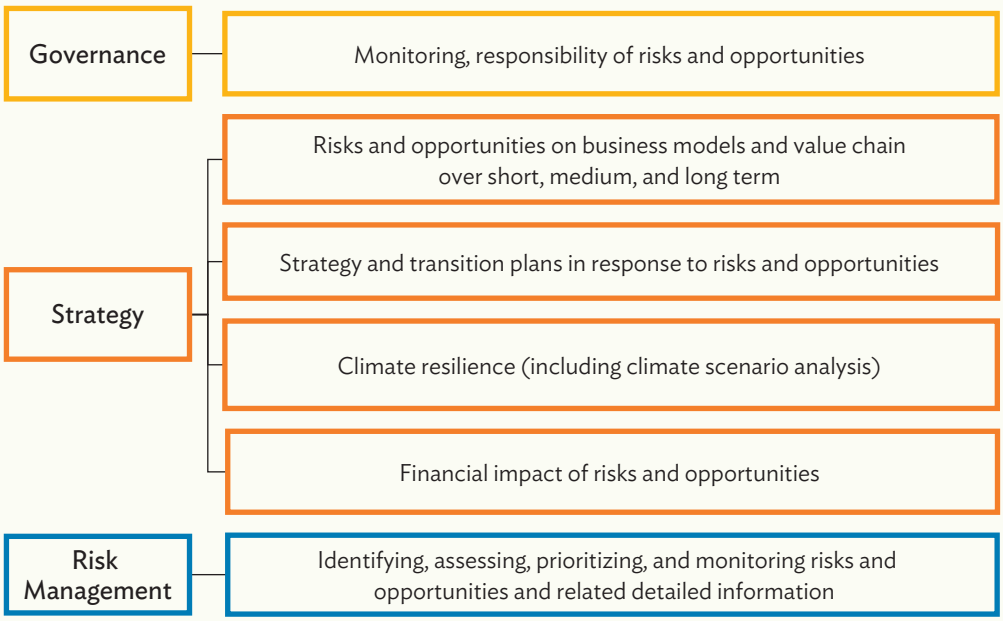
The ISSB's IFRS S1 and S2 are mainly built on the TCFD recommendations' four pillars (governance, strategy, risk management, and metrics and targets). The overall content of the ISSB Climate Related Disclosure (IFRS S2) is fully compliant with the TCFD recommendations by requiring companies to provide information of climate-related physical and transitional risks and opportunities. Industry-specific disclosures are built on the SASB standards that were revised for international applicability.

Figure 6.6a highlights the main elements of the governance, strategy, and risk management pillars. Nonetheless, the ISSB requires disclosure of more detailed and comprehensive information as for the four pillars. On the strategy pillar, the ISSB requires a climate scenario analysis—a long-term analysis to examine the impact of climate changes on corporate financial positions (such as sales, cash flows, and profits) under various climate scenarios as visualized in Figure 6.2 and Figure 6.3. But the climate analysis can be conducted in a flexible manner depending on the company's circumstance. Companies with a high degree of exposure to climate risks are able to use a simpler "qualitative" scenario analysis if they are not equipped with skills, capabilities, or resources needed to perform quantitative analysis. Over time, however, such companies are expected to accumulate capabilities and thus are expected to apply a more advanced "quantitative" climate scenario analysis.

One of the features on the IFRS S2 is the scope of detailed information disclosure particularly with regard to the metrics and targets pillar. As for the metrics, the ISSB Standards encourages companies to disclose not only Scope 1 and 2, but also the entire value chain (upstream and downstream, Scope 3) GHG emissions for all companies regardless of whether Scope 3 emissions are material. The disclosure of Scope 3 emissions data can be delayed for 1 year due to the complexity of measuring emissions. Compared to Scope 1 and Scope 2 GHG emissions, companies may more often use estimation based on various inputs in addition to direct measurement of GHG emissions. Companies are required to disclose the measurement approaches, inputs, and assumptions used and prioritize on using verified data.

Moreover, the ISSB placed emphasis on encouraging companies to disclose GHG emissions data using an absolute amount (metric tons of CO_2 equivalent) rather than the intensity indicator (such as GHG emissions divided by output or sales). Thus, companies have to make greater efforts to reduce their emissions across business units within their groups and through more actively engaging with suppliers.

Figure 6.6a: ISSB Climate-Related Disclosure: Governance, Strategy, and Risk Management Pillars

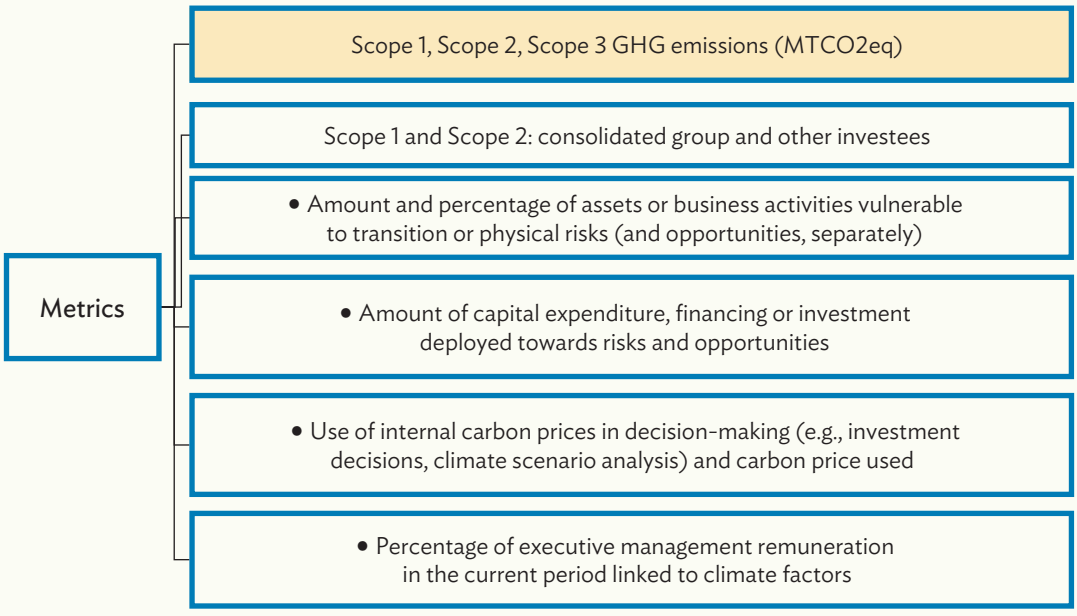


Source: Prepared by the author based on ISSB (2023b).

This means investors and other stakeholders could get more clear, reliable, consistent information about companies' actual climate change mitigation efforts and progress relative to their emissions targets. Companies are given 1-year relief from disclosing Scope 3 GHG emissions data. The ISSB places GHG emissions data as most important basic information and requires a number of detailed requirements compared to the TCFD recommendations. Companies are required to disclose seven cross-industry metric categories including GHG emissions data. Major points or data requirement with regards to climate-related metrics are highlighted below (Figure 6.6b):

- Disclosure of Scope 1, Scope 2, and Scope 3 GHG emissions data should be expressed as metric tons of CO2 equivalent. Information about the measurement approach, inputs, and assumptions used to measure GHG emissions, as well as the reasons for doing so shall be disclosed.
- Disclosure of Scope 1 and Scope 2 GHG emissions data is required by dividing into two groups: the first group is the consolidated accounting group (parent and its consolidated subsidiaries), and the other group covers other investees such as associates, joint ventures, and unconsolidated subsidiaries.
- The amount and percentage of assets or business activities vulnerable to climate-related transition risks (e.g., volume of real estate collaterals highly exposed to transition risk) shall be disclosed.
- The amount and percentage of assets or business activities vulnerable to climate-related physical risks (e.g., proportion of property and infrastructure in areas subject to flooding, heat stress or water stress) shall be disclosed.
- The amount and percentage of assets or business activities aligned with climate-related opportunities (e.g., revenues from products or services supporting the transition to a lower-carbon economy) shall be disclosed.

Figure 6.6b: ISSB Climate-Related Disclosure with Regards to Metrics



GHG = greenhouse gas, ISSB= International Sustainability Standards Board, MT = million tons.

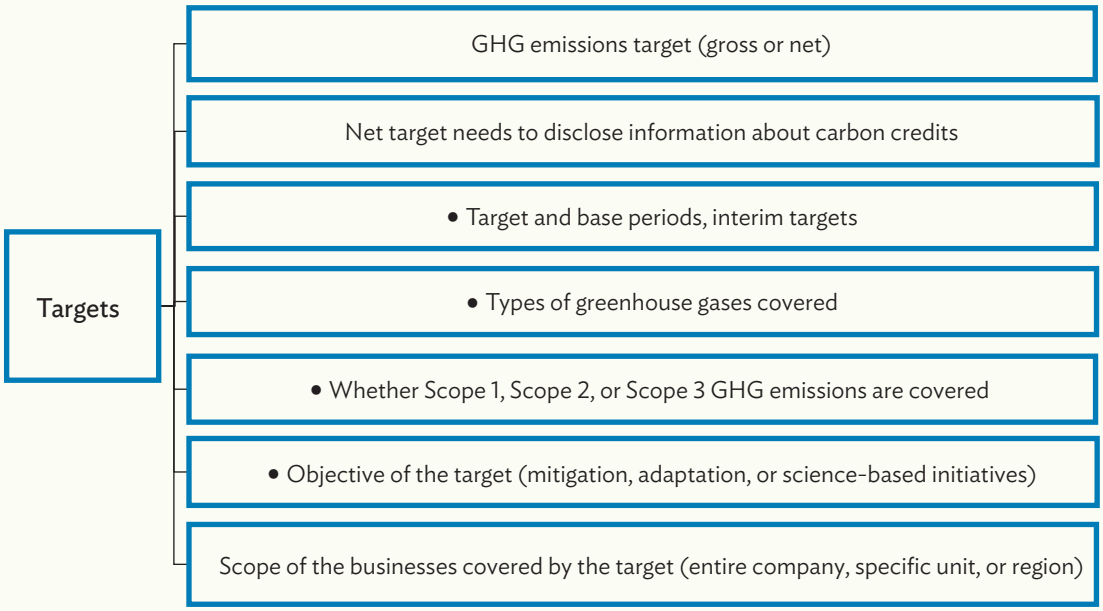
Source: Prepared by the author based on ISSB (2023b).

- The amount of capital expenditure, financing or investment deployed towards climate-related risks and opportunities shall be disclosed.
- Information about internal carbon prices—explaining whether and how applying a carbon price in decision making (such as investment decisions, transfer pricing, and climate scenario analysis) shall be disclosed. The price for each metric ton of GHG emissions used to assess the costs of its GHG emissions should be specified.

The IFRS 2 concerning climate-related targets involves both the quantitative and qualitative targets used to monitor progress toward achieving goals including GHG emissions targets. Companies using net GHG emissions targets are required to disclose offsetting measures—such as carbon credits, which are transferable or tradeable instruments. This is to clarify a company's own emissions reduction efforts without depending excessively on meeting its GHG emissions targets by purchasing carbon credits from third parties. Companies shall provide information about approaches to setting and reviewing each target and monitoring progress against each target. For example, information on whether the target and the methodology for setting the target has been validated by a third party, how the process of reviewing the target is made, what metrics are used to monitor progress toward reaching the target, and whether revisions to the target was made. Major points related to climate-related targets are summarized below (Figure 6.6c):

- Need to specify whether GHG emissions targets is gross or net. Gross GHG targets reflect the total changes in GHG emissions planned within the value chain, while net GHG emissions targets are the targeted gross GHG emissions minus any planned offsetting efforts (such as carbon credits).
- In case of using a net GHG emissions target, it is required to disclose a gross GHG emissions target, planned use of carbon credit to achieve a net target, as well as the extent to which carbon credits to achieve net GHG emissions targets. Companies should disclose information such as which third-party schemes will verify the planned use of carbon credits, whether the underlying carbon offset will be nature-based (such as reforestation, afforestation, soil carbon sequestration) or based on technological carbon removals (such as direct air capture; carbon, capture, utilization, storage; bioenergy with carbon capture and storage).
- Need to specify whether the GHG emissions target cover Scope 1, Scope 2, or Scope 3 GHG emissions.
- Need to clarify the types of greenhouse gases covered by the GHG emissions target.
- The objective of the target (for example, mitigation-related target such as GHG emissions, adaptation target, or conformance with science-based initiatives) shall be disclosed.
- The scope of the businesses to which the target applies (for example, applicable to the company as a whole or a specific business unit or specific geographical region) shall be disclosed.
- The period over which the target is applied (such as 2030, 2050) and the base period from which progress is measured, as well as interim targets shall be disclosed.
- Description on whether it is an absolute target or an intensity target If the target is quantitative shall be disclosed.
- Reference to how the latest international agreement on climate change (such as the Paris Agreement goals), including how jurisdictional commitments that arise from that agreement (such as NDCs and net-zero targets), have informed the GHG emissions targets shall be disclosed.

Figure 6.6c: ISSB Climate-Related Disclosures with Regards to Targets



GHG = greenhouse gas, ISSB= International Sustainability Standards Board.

Source: Prepared by the author based on ISSB (2023b).

The ISSB also developed Industry Based Guidance for IFRS S2 with respect to the consumer goods sector (six subsectors), the extractives and minerals processing sector (eight subsectors), the financial sector (five subsectors), the food and beverage sector (seven subsectors), the health sector (five subsectors), the infrastructure sector (eight subsectors), the renewable resources and alternative resources sector (six subsectors), the resource transformation sector (five subsectors), the services sector (three subsectors), the technology and communications sector (six subsectors), and the transport sector (nine sectors). The guidance is based on the SASB Standards that identify particular environmental, social, and governance issues for companies, but revised by taking into account rules and indicators adopted by international organizations.

GHG emissions for the finance sector including asset management companies, banks, and insurance companies, mainly arise from financed emissions (Scope 3 GHG emissions). They are required to describe how ESG factors are integrated into their financing and asset management decisions. In addition, commercial banks need to describe how ESG factors are reflected in estimating possible financial losses and report significant concentrations of credit exposure to ESG factors including carbon-intensive assets and water-stressed regions. Insurance companies need to provide a wide range of information, for example, including disclosing their approaches to incorporate environmental risks into the underwriting process and physical risk exposure by providing quantitative data (such as the probable maximum loss and total losses attributable to insurance pay-outs). This reflects that the viability of nonlife insurance businesses, which provide insurance for property, casualty, and liability risks, is increasingly threatened by climate change due to a rising number of insurance claims for property damage and liability issues and resultant insurance payouts. As a result, they find it inevitable to allocate more resources to risk assessment and adjust insurance premiums and coverage.

6.3 Expected Government Actions to Promote Sustainable Finance and Financial Stability in Asia

Financial supervisors are increasingly aware of physical risks and transition risks as well as financial risks resulting from them. As for physical risks, the increasing frequency and severity of climate change-driven natural hazards and extreme weather are already causing substantial economic and social losses and associated financial losses to communities, companies, and individuals and thus financial institutions in the world. These losses are expected to increase further in the future. Meanwhile, transition risks will take place gradually and they could be amplified if the transition to a low carbon economy occurs in a disorderly manner—such as the case of disorderly scenarios (delayed 2°C scenario and divergent net-zero scenario) highlighted in Figure 6.6c. Physical and transition risks could destabilize the financial sector and financial systems through a sudden rise in risk premia and an abrupt decline in assets prices, thus generating significant downward pressures on corporate activities and economic growth. Climate-related financial risks might become systemic across sectors and borders. Thus, coping with these risks could enhance financial stability. Increasing awareness of climate-related financial risks also helps foster sustainable finance and thus improve financial allocation to low carbon or decarbonization projects and activities. So far, low carbonization and decarbonization efforts concentrate in high-income countries and high emissions in large emerging economies such as the People's Republic of China. The focus should also be paid to other EMDEs that also require a shift to low-carbon alternatives while sustaining economic growth. Especially, Asia needs greater attention due to rising physical and transition risks and their heavy dependence on fossil fuels.

6.3.1 Understanding Climate-Related Financial Risks

There is an increasingly shared understanding that climate risks should be treated as financial risks that have the potential to undermine the soundness of financial institutions and pose risks to overall financial stability. However, there are differences between traditional financial risk and climate-related financial risk. The impacts of climate risks on financial stability can be intricate, extensive, and profound with a higher level of uncertainty, including tail risk. The duration of the risks may span long-term horizons. Climate change has the capacity to generate substantial risks affecting specific activities and the financial performance of countries, regions, companies, and individuals. Moreover, there is the possibility that such risks may manifest intensely and simultaneously across multiple countries and regions, posing challenges in providing timely and necessary relief measures and support.

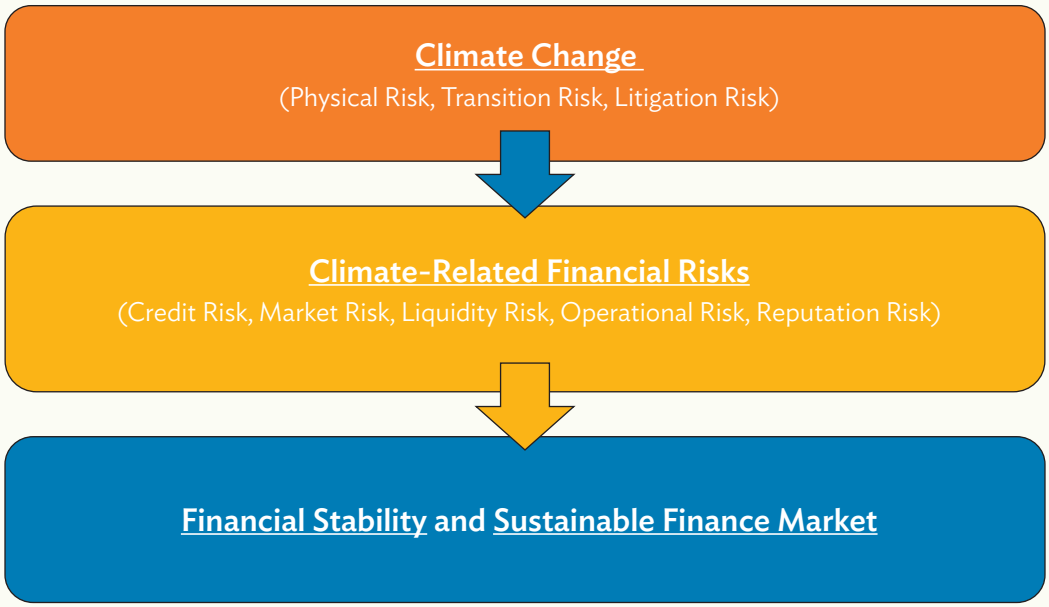
Climate-related financial risks are generally decomposed into five types of risks—credit risk, market risk, liquidity risk, operational risk, and reputation risk (BCBS 2022). These financial risks could lead to losses of financial institutions, undermining financial stability (Figure 6.7).

- Credit risk refers to the potential financial losses arising from bank loans and bond finance when a counterparty borrower fails to repay their debt in a timely manner due to the adverse impacts of climate change. Climate-induced defaults resulting from severe floods and rising sea levels are already happening worldwide. Some low-income developing countries are grappling with debt crisis triggered by climate change (so-called "climate debt trap"). When a bank experiences significant loan losses, it not only encounters challenges in extending new credit to other companies and individuals but also faces bank runs. Similarly, an insurance company confronted with large financial losses from its financing activities may struggle to meet increasing insurance claims and face insolvency problems.

- Market risk is related to the risk of facing a decline in the market value of financial assets including bonds, stocks, derivatives, and real estate, due to the adverse impacts of climate change. Assets associated with carbon-intensive companies and projects are more susceptible to decline compared to those related to low-carbon companies and projects. Currently, many of these financial assets do not adequately account for climate factors in their market prices. This is partly due to insufficient climate actions taken by governments, such as inadequate carbon pricing mechanisms aimed at altering the relative costs between carbon-intensive and low-carbon energy sources. If climate policy actions are implemented in a disorderly manner, it could lead to sudden shifts in market prices and significant financial losses for investors and financial institutions.
- Liquidity risk refers to the potential inability of a financial institution to swiftly acquire the necessary cash to meet its immediate payment obligations such as rapid withdrawals of deposits by selling assets. The presence of liquid markets facilitates smooth cash generation through market transactions, with numerous buyers and sellers readily available. For instance, the period between March and May 2023 witnessed the failure of Silicon Valley Bank, Signature Bank, and First Republic Bank in the United States due to liquidity risk. These banks encountered challenges in obtaining cash due to capital losses resulting from the sale of treasury securities and other bonds—whose values were rapidly dropping as the United States Federal Reserve increased the federal funds rate drastically in a short period—in the face of rapid withdrawals of bank deposits. Financial institutions may face similar liquidity risks associated with climate risks, leading to bank runs, when assets such as bank loans extend to carbon-intensive companies This kind of liquidity risk could happen to financial institutions when their assets such as bank loans or bond finance toward emissions-intensive companies, which are currently liquid, suddenly turn into illiquid assets as market sentiments change. Such banks may face bank runs.
- Operational risk is associated with climate-related legal and regulatory compliance risks. This type of risk arises from the potential losses incurred by failing to meet climate-related regulatory and legal obligations. Examples of such obligations include automotive emissions controls, energy efficiency regulations, nature preservation requirements, and data disclosure mandates. Additionally, operational risk can also happen as extreme weather events cause damage to factory and office operations, further exacerbating potential losses.
- Reputational risk is important for financial institutions since their business is based on trust from clients. Their reputation can deteriorate if financial institutions face many litigation cases and penalty payments, and negative media coverage increases. Under such conditions, a change in market, client, or consumer sentiment may lead to a loss of clients and businesses. Civil society is increasingly monitoring financial institutions' activities with regards to financing fossil fuel related sectors and disclose their analysis. Legal actions can arise when engagement with such companies do not know marked improvement.

The World Business Council for Sustainable Development, a global organization comprising global chief executive officers of more than 200 leading companies, pointed out that the number of lawsuits has been rising sharply against companies on ESG issues over the past decade (WBSCD 2023). Litigation is increasing against companies as a result of activities of their subsidiaries or suppliers. More importantly, litigation takes place with reference to regulations such as the French Duty of Vigilance Law (Due Diligence Law) adopted in 2017, but also with regards to soft laws or principles including biodiversity conventions, the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, etc.

Figure 6.7: Climate-Related Financial Risks, Sustainable Finance, and Financial Stability



Source: Prepared by the author.

6.3.2 FSB's Roadmap for Addressing Climate-Related Financial Risks

The Financial Stability Board (FSB) recognizes the need to prioritize climate-related financial risks to safeguard the stability of financial institutions and the overall financial system. In response to the request from the G20 Financial Ministers and Central Bank Governors, the FSB published a comprehensive roadmap in July 2021. This roadmap focuses on coordinating international supervisory and regulatory efforts pertaining to climate-related financial risks, which have a global impact (FSB 2021b). The roadmap consists of four priority areas: (i) firm-level disclosure, (ii) data compilation and aggregation, (iii) financial vulnerability analysis, and (iv) regulatory and supervisory practices and tools. Each priority area outlines detailed steps that will be implemented by global initiatives and financial supervisors in each jurisdiction, in consultation with organizations such as the Basel Committee on Banking Supervision, the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), the International Organization of Securities Commissions, and other international standard setters (FSB 2021b, 2022a).

- Firm-level disclosure, which has already been discussed in detail in the previous section, will also be further elaborated on below. Financial institutions can enhance the reliability of their emissions data from financing activities once they have access to GHG emissions data from their corporate counterparties. This availability will be facilitated by international disclosure standards led by the ISSB based on the TCFD recommendations, the revised SASB Standards, and other relevant disclosure frameworks. Firm-level disclosure serves as the foundation for the other three priority areas, including data compilation and aggregation.
- Data compilation and aggregation involve the development of comprehensive, consistent, and comparable data to assess and monitor climate-related financial risks faced by companies, financial institutions, and the overall financial system, with the ultimate goal of ensuring

financial stability. International coordination is crucial to enhance data availability for cross-border comparability. In particular, it is important to collect and compile data that reflect the degree, scale, and concentration of a financial institution's exposure to climate risks, as these factors can have implications for financial stability. Such data should encompass both physical risks and transition risks, enable the aggregation of a financial institution's climate risk exposure, allow for cross-country comparisons, and facilitate forward-looking assessments of climate risks to financial stability. The FSB has identified significant data gaps concerning the availability and consistency of data on the underlying drivers of climate-related risks. Additionally, there is a need to improve the quality and consistency of data on financial institutions' exposure to climate-related risks arising from their relationships with corporate counterparties. Furthermore, it is essential to develop forward-looking metrics on climate risks at the individual firm level and for the financial system as a whole (FSB 2021a).

- Financial vulnerability analysis involves the development and refinement of analytical tools used to assess and monitor climate-related vulnerabilities. This includes utilizing available monitoring tools, establishing conceptual frameworks, and conducting climate scenario analysis.
- Regulatory and supervisory practices and tools, closely linked to vulnerability analysis, have been formulated by international bodies, encompassing supervisory risk management expectations and guidance for the banking, insurance, and asset management sectors (FSB 2022b). As a result of these advancements, several financial supervisors have already begun incorporating climate-related financial risks into their overall supervisory frameworks. This entails further enhancing and applying climate scenario analysis within stress testing exercises, which have implications for capital adequacy. Given the shared focus on developing and utilizing climate scenario analysis, this article views that financial vulnerability analysis and regulatory and supervisory practices and tools can be integrated into a cohesive framework. While the consideration of microprudential and macroprudential approaches is beyond the scope of this article, it is worth exploring their potential integration as well (Shirai 2023a).

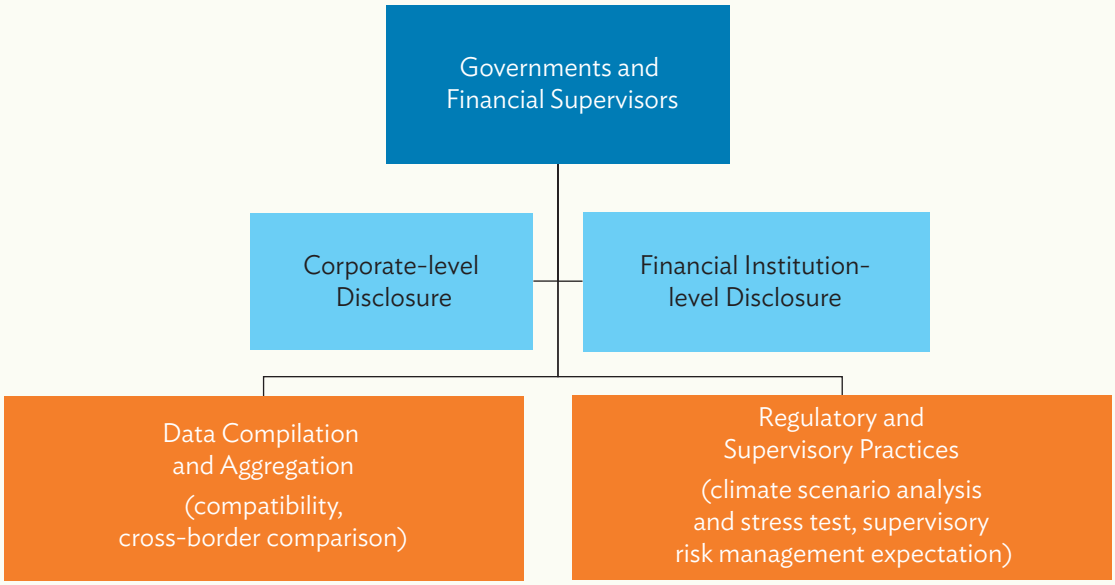
6.3.3 Processes Leading to Risk Management to Ensure Financial Stability

This chapter presents a perspective that the FSB roadmap can be reorganized in terms of highlighting the step-by-step processes that would contribute to monitoring and assessing climate-related financial risks, thereby ensuring financial stability through supervisory and regulatory frameworks (Figure 6.8). The initial crucial step involves promoting corporate-level disclosure aligned with the TCFD recommendations and the IFRS Sustainability Standards on Climate-Related Disclosures (ISSB S2). This enables financial institutions to access more reliable data on financed emissions and enhance their internal risk management practices. As a next step, the availability of comparable and consistent data facilitates the compilation of aggregate information across sectors, countries, and regions. The deeper understanding of the vulnerability of the financial system to climate risks can be further enhanced through the implementation of climate scenario analysis.

Meanwhile, as companies and financial institutions improve their disclosure practices, a subsequent stage can be initiated where major financial institutions under the initiatives of central banks and financial supervisors, conduct climate scenario analysis using corporate-level data and estimations. Notably, the NGFS has developed several long-term climate scenarios, which can be applied to financial institutions from a supervisory standpoint (Figure 6.3). These scenarios are increasingly utilized by financial supervisors and central banks in the world to conduct climate scenario analysis for major banks and insurance companies within their jurisdictions. Furthermore, companies can also employ these scenarios in their scenario analysis, aligning with the strategy pillar of the TCFD recommendations and the ISSB Standards. Over time, these scenarios have been refined and updated with the availability of additional data and the development of advanced modeling and analytical methodologies.

Despite the inherent uncertainty surrounding the realization of physical and transition risks, it remains worthwhile for governments and financial supervisors to encourage companies and financial institutions to conduct climate analysis. This fosters a better understanding of climate-related risks and opportunities and facilitates the formulation of more effective transition strategies toward achieving net-zero emissions by around 2050. Moreover, such analysis provides valuable insights into the resilience of the macro-level or financial system-wide framework against climate risks. Climate scenario analysis enhances the awareness of climate-related financial risks among financial institutions and supports their risk management practices, while also facilitating the adoption of climate-related financial supervisory approaches. The accumulation of experiences, coupled with data compilation and aggregation efforts, can stimulate discussions on the implications of climate change for capital adequacy requirements and other measures within the Basel framework—a set of global standards for the prudential regulation of banks set under the Basel Committee on Banking Supervision (BCBS).

Figure 6.8: Process Leading to Climate-Related Financial Risk Management



Source: Prepared by the author based on FSB (2021a, 2022a).

6.3.4 Corporate Disclosure as a Basis for Addressing Climate-Related Financial Risks

Based on the aforementioned arguments, countries and their regulators should establish firm-level disclosure as the foundation for advancing data compilation and aggregation, as well as regulatory and supervisory practices and tools. Regulators need to expedite the dissemination of disclosure requirements to companies and financial institutions, implementing transition periods in a phased approach. Figure 6.9 provides a visual representation of the process for promoting firm-level climate-related disclosure. These steps will be crucial for facilitating data compilation and aggregation, as well as regulatory and supervisory approaches.

Aa a first step, countries that have not yet initiated climate-related disclosure for companies and financial institutions within their jurisdiction should publicly endorse the TCFD recommendations and the IFRS Sustainability Disclosure Standards (IFRS S2). They can first encourage companies and financial institutions to voluntarily disclose information in line with the TCFD recommendations first, following a principle-based approach and reporting on a "comply or explain" basis. As companies become more familiar with disclosure and reporting practices, the possibility of making TCFD-based disclosure and reporting mandatory can be explored. Since IFRS S2 requires more comprehensive and detailed disclosure, initial efforts of promoting corporate disclosure can be targeted toward larger listed companies that are already familiar with the TCFD recommendations. Once the familiarity with the recommendations is enhanced, countries can consider aligning climate disclosure with IFRS S2, gradually transitioning from the TCFD recommendations. For countries that have already been encouraging larger listed companies and financial institutions to disclose based on the TCFD recommendations, expediting the process of aligning climate disclosure with the IFRS standards can be prioritized.

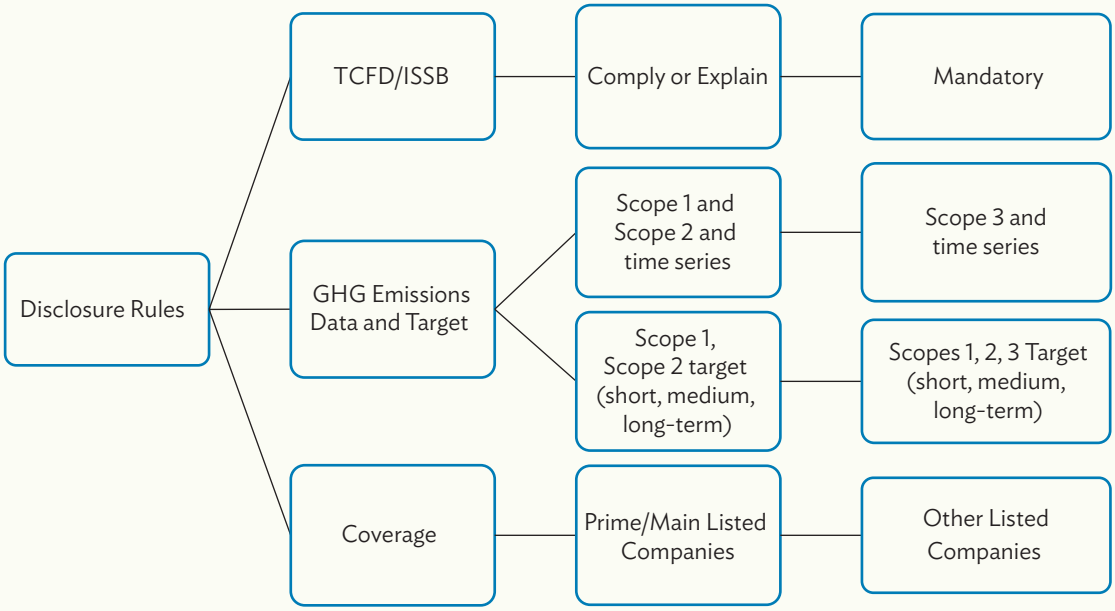
As a next or second step, the disclosure of climate-related data and targets could be implemented in a phased approach. If most of the companies in their jurisdictions are unfamiliar with TCFD-based disclosure practices, regulators should encourage companies to disclose GHG emissions data for Scope 1 and Scope 2 categories first. Subsequently, regulators can progress to disclose Scope 3 GHG emissions data with clear timelines. For companies, learning about calculating and estimating Scope 3 GHG emissions data using internal and external sources may require some time. The quality of such data is also likely to improve over time as collective efforts across sectors and companies globally accelerate. Thus, Scope 3 emissions data are likely to be revised compared with Scope 1 and Scope 2 categories. These data should be mandatory with some relief periods for Scope 3 GHG emissions data.

Moreover, companies should be encouraged to set GHG emissions targets for medium-term (e.g., 2030) and long-term (e.g., achieving net-zero emissions by 2050) time spans using Scope 1 and Scope 2 categories. Companies should also be encouraged to establish short-term GHG emissions targets (e.g., for the next 1–5 years) that align with their medium- and long-term targets and should be integrated into the existing corporate medium-term managerial planning. Setting targets for emissions should be mandatory. While setting Scope 3 emissions target is desirable, the coverage and methodologies could be revised overtime given the challenged related to Scope 3 emissions data. Making Scope 3 emissions target could be discussed by each regulator considering industry- and country-specific conditions.

Currently, many countries official endorse TCFD-based guidelines without requiring the disclosure of GHG emissions data and targets. Countries should mandate all four pillars of the disclosure framework with clear disclosure requirements on transition plans and climate scenario analysis (both in the strategy pillar) and metrics and targets pillar with some timelines. Detailed issues related to the strategic pillar with emphasis on climate transition plans and climate scenario analysis is discussed in Shirai (2023b).

As for a phased-in approach, regulators may apply the TCFD recommendations and ISSB climate-related standards (IFRS S2) in an initial stage mainly to large companies listed in the prime or main segment of the stock exchange in their jurisdictions (ISSB 2023d). Subsequently, these requirements can be extended to companies listed in other segments of the stock exchange (such as standard or growth segments) and some larger unlisted companies, allowing for longer adjustment periods and setting specific timelines. The coverage of disclosure requirements could be more flexibly treated for other segments of the stock exchange. In later stages, consideration can be given to applying these disclosure standards to unlisted companies, with potential adjustments in the disclosure requirements

Figure 6.9: Corporate Climate-Related Disclosure Rules



GHG = greenhouse gas, ISSB = International Sustainability Standards Board, TCFD = Task Force on Climate-related Financial Disclosure.

Source: Prepared by the author.

to strike a balance between the benefits and burdens associated with disclosure for these entities. Some companies regardless of their size or listing may voluntarily disclose information in line with ISSB standards in the face of growing demand from global clients and stakeholders.

6.4 Conclusions

There is no question that governments should bear the primary responsibility for implementing more ambitious climate policies to drive the transformation of industries and businesses toward greater environmental sustainability and achieving a low-carbon economy. At the same time, countries should ensure the availability of financial resources from both domestic and foreign public and private sources to support investments in clean energy, low-carbon technologies, and decarbonization efforts. This chapter emphasizes the significance of reliable, comparable, and consistent corporate climate-related data disclosure and reporting as a foundation for evaluating and monitoring climate-related financial risks. This, in turn, can contribute to safeguarding long-term financial stability by raising awareness of climate-related financial risks among financial institutions and fostering the growth of sustainable finance resulting from increased trust from investors and financial institutions. To expedite this process, it is crucial for Asian governments to encourage companies to disclose accurate GHG emissions data, targets, and other climate-related information in alignment with the TCFD recommendations and the ISSB Standards.

Asian governments need to take these actions urgently. Meanwhile, they need to be aware that broader regulatory and supervisory measures should be considered as a next step in view to promoting sustainable finance and financial stability. These include promoting the integration of climate factors into portfolio asset management by institutional investors, implementing interoperable taxonomies or classifications, addressing greenwashing practices, and regulating ESG assessment companies and auditors. This chapter primarily focuses on corporate climate-related disclosure starting with GHG emissions as the initial step to enable investors and financial institutions to assess investment risks and returns and enhance climate-related supervisory and regulatory frameworks more accurately. In particular, the Asian region critically needs to share a sense of urgency in promoting standardized corporate climate-related disclosure due to the high degree of vulnerability to climate risks, large infrastructure and clean energy investment needs, and inadequate green finance to support ambitious low-carbon growth goals.

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PART II

Investing in a New and Sustainable Economy

CHAPTER 7

ASEAN's Regional Economic Integration Amid the Digital and Green Growth Era

Kiki Verico and Yeremia Natanael

7.1 Introduction

The Association of Southeast Asian Nations (ASEAN) Way has two characteristics: soft and open regionalism. Soft means its decision-making process is based on consultation and consensus instead of a voting mechanism basis. Open means its economic transformation from trade to investment or production network development utilizes a regional-plus framework. ASEAN provides the "unconditional" free principle based on its Treaty of Amity and Cooperation and inclusive principle. The ASEAN principle is also forward-looking by adopting economic convergence to transform its economic integration from the economic community to the common market. As the world's economy has entered a digital and green economy era, ASEAN needs to adjust to these new circumstances.

Economic divergence within member states in ASEAN makes the response and resiliency toward these transformations different. The ASEAN Way explains how the ASEAN member states respond and adjust to this transformation. For example, given a member state's economic divergence, there is always a faster and slower phase of the member state's response to the change where ASEAN provides the ASEAN umbrella to combine a hybrid approach of waiting for the slowest member state to respond and do it together accordingly and giving flexibility for the faster member state to act before others. This action requires inclusive free and open principles that ASEAN adopts and implements for its regional cooperation. This chapter explains how ASEAN enters the digital and environmental-friendly transformation.

First, the digital era transformation. Cross-border transactions involving services include the movement of either the producer, the consumer, or capital for investment purposes. The General Agreement on Trade in Services (GATS) defines cross-border trade in services using four modes of supply: Mode 1 involves the flow of services from one country's territory to the trade partner's territory; Mode 2 consists of the collection of services from one country to consumers from another country; Mode 3 involves services provided by a service supplier of one country in the territory of another country, including through ownership or subsidiaries; and Mode 4 involves services provided by a service supplier of one country through the presence of natural persons in the territory of another country. Modes 1 and 2 could reflect the free flow of goods, Mode 3 represents the free flow of investment, and Mode 4 reflects the free flow of people. Hence, the free flow of people can be linked to the free flow of goods and investment.

Recent technological advancements have facilitated cross-border transactions through the digital trade of goods and services. This type of trade encompasses all digitally ordered and delivered goods and services. The study by the Organisation for Economic Co-operation and Development, the International Monetary Fund, and the World Trade Organization (OECD, IMF, and WTO 2020) define digitally delivered trade as international transactions electronically delivered remotely through computer networks, including insurance and financial services, professional services, sales and marketing, research and development, and education services (UNCTAD 2022). On the other hand, digitally ordered trade refers to international purchases and sales of goods or services through computer networks designed for this purpose, similar to e-commerce. The data movement across borders is thus

an essential element in the growth of service supply models, as well as production networks (González 2019). Data also links firms and consumers globally, facilitating the management of global production networks and business-to-business transactions within them and transactions between consumers or businesses purchasing from each other through online platforms (OECD 2019).

The digital economy plays a crucial role in the international trade of the ASEAN member states, particularly for their micro, small, and medium-sized enterprises (MSMEs). The ASEAN digital economy is overgrowing, with the market size expected to exceed $360 billion by 2025 and grow to $1 trillion by 2030 due to the growth in e-commerce, digital financial services, and food delivery (Google, Temasek, and Bain & Company 2022). The digital platform business alone has created 160,000 direct jobs and an additional 30 million indirect jobs. The e-commerce industry thrives, with 20–25 million unique merchants operating across marketplaces, direct-to-consumer, and grocery platforms.[1]

Digitalization offers new opportunities for MSMEs to expand their business and increase productivity by using digital tools and technologies to reduce production costs. According to a survey conducted by the International Chamber of Commerce (ICC) and Google (2022), 80% of MSMEs in ASEAN have increased their use of digital tools in 2020–2021, indicating these businesses' growing adoption of digital tools and technologies. This shift toward digitalization presents new opportunities for MSMEs in the region to reduce production costs, enhance business productivity, and expand their international reach. The adoption of digitalization by MSMEs is significant for their internationalization process, as increased international exposure has been linked to higher wages and increased job creation for productive firms (Wagner 2012). By lowering trade costs and connecting supply and demand through digital platforms, MSMEs can overcome constraints associated with exporting and tap into new markets (González 2019).

Second is the environment-friendly transformation. Regional economic cooperation in Southeast Asia as a global production and service network must accommodate another vital era in addition to a digital-inclusive economy: the green value chains. The ASEAN Way with unconditional free, open, and convergence help the ASEAN member states to be aware and appropriately respond to the demand-driven green economy. This will secure ASEAN's regional value chains now and in the near future.

If a digital economy implements inclusive of a bottom-up economy, an environment-friendly economy applies a green economic spirit. The latter adopts net-zero emissions (NZE), which covers both emissions reduction from upstream energy transition and downstream emissions reduction. NZE reflects at least two commitments, the Nationally Determined Contributions (NDCs) and the Low-Carbon Development Initiative.

Unlike digital transformation, which is market-driven, the green economy is government-driven. The latter has several layers from the global United Nations Framework Convention on Climate Change (UNFCCC), which continue the forerunner global legally binding commitment on greenhouse gas (GHG) emissions reduction of the Kyoto Protocol, Durban Platform, and Paris Agreement. The UNFCCC has a series of formal meetings to keep this global commitment on track entitled the Conference of the Parties (COP).

At the regional level, in the Report on Promoting Sustainable Finance in ASEAN on 29 April 2020 (ASEAN Secretariat 2020b), the regional commitment carries a clear message as follows: "We envisage that sustainable finance plays an important role to improve our economic efficiency, prosperity, and competitiveness while protecting and promoting ecological systems, and enhancing cultural diversity

[1] See https://economysea.withgoogle.com/

and social well-being." (Joint statement of the 5th ASEAN Finance Ministers' and Central Bank Governors' Meeting, 5 April 2019).

The issues at the member state level are how ASEAN member states respond to the different phases of climate change's commitment implementation due to their economic divergence and dominant economic sector backbone. The ASEAN State of Climate Change Report gives economic level divergence and its different phases of response to climate change (ASEAN Secretariat 2020c). The important thing is in a country's level of transparency over the Enhanced Transparency Framework (ETF). This ETF has become the building block for the ASEAN regional commitment to climate change.

7.2 Context

The COVID-19 pandemic has led to an increase in digital use in ASEAN. Taking a sample of six member states (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam), there was an increase in the average growth of export in digitally deliverable services from 3.38% in 2019 to 5.72% in 2021 (Figure A7.1 in the Appendix), exhibiting positive growth of digital trade in services particularly post-pandemic and indicating the utilization of electronic trade administration documents. Using data from Google, Temasek, and Bain & Company (2022), the six ASEAN member states have made notable recent progress in developing a digital economy. For example, the aggregate gross merchandise values of the digital economy in these countries have jumped significantly, from $102 billion in 2019 to $194 billion in 2022 (Figure A7.2). This fact indicates that countries have progressed in establishing and maintaining their domestic electronic transactions framework. Moreover, it suggests establishing digital identity and authentication systems and e-invoicing for local transactions (Tong, Li, and Kong 2021).

Those movements toward digitalization might become one of the main strengths of the digital economy to expand business within local markets in ASEAN member states, including for micro and small and medium-sized enterprises (MSMEs). According to the World Economic Forum Survey (2021), most MSME owners wanted to further digitalize their life, indicating that digitalization would likely accelerate. Most (74%) MSME owners in ASEAN have implemented digitalization for more than half of their tasks. This fact indicates the influence of digitalization, as those who have already acquired a satisfactory level of competence and benefitted from its advantages are now motivated further to enhance their digitalization efforts (WEF 2021). Another aspect that could strengthen the digital economy and cross-border transactions is government provision to promote access and inclusion of information technologies for the people, measured by the E-government Development Index. While the overall index of the six ASEAN member states ranging from middle inclusivity to very high inclusivity, the human capacity shows a promising potential with an index ranging from high to very high inclusivity (Table A7.1).

The opportunity for cross-border transactions using digital trade could be encouraged by at least three main features. First is from the demand side, where there was an increasing trend in the use of digital technology. For instance, there was a rising trend in internet connectedness that allows people to access online products and services (World Bank 2019), the number of social media users with a regional social media penetration at 63.7% (Statista 2023), and consumer spending on online time that reach 10 hours a day in average (Google, Temasek, and Bain & Company 2019). These trends could encourage Southeast Asian businesses to innovate, adopt new technologies, and sell online (Hoppe, May, and Lin 2018), and more MSMEs might be favored by the low-cost, mass form of advertising that can influence consumers with product research and brand engagement. On the supply side, the infrastructure of information and communications technology (ICT) also supports the emerging use of digital technology for cross-border transactions. As indicated by the Telecommunication Infrastructure Index in the six ASEAN member states (Table A7.1), for example, that could be classified as high for Indonesia, Philippines, and Viet Nam, and very high for Malaysia, Singapore, and Thailand.

Second, the utilization of quick response (QR) payment for cross-border financial services within the ASEAN region presents an opportunity to enhance payment connectivity and support cross-border trade, investment, tourism, and other economic endeavors. The cross-border QR payment service enables the payment for goods and services across ASEAN member countries. Currently implemented in Viet Nam, Indonesia, Malaysia, Singapore, and Cambodia,[2] this service holds particular advantages for MSMEs by facilitating their engagement in international markets. Moreover, it caters to the needs of individuals such as tourists (Mode 2), business visitors (Mode 4), and those making purchases from overseas providers (Mode 1), who desire to make QR code-based payments for goods and services when abroad. This fact aligns with the demand for digital payment solutions expressed by three-quarters of MSME owners in the region (WEF 2021).

Third, the significant role of MSMEs in ASEAN presents another area of potential optimization. Southeast Asia alone houses a staggering 71 million MSMEs, accounting for 97% of all businesses in the region (Tan 2022). Despite their abundance, MSMEs in the region contribute an average of 40.5% to each country's gross domestic product (GDP) and 19.2% to the total export value in 2020. This situation creates an opportunity for digital platforms to foster the growth of MSMEs by enhancing operational efficiency, expanding customer reach, and facilitating access to finance. Digital technologies have been suggested to streamline processes, support data-driven decision making, and automate routine tasks, while the internet has significantly reduced the costs associated with service delivery, marketing, ordering, and payment for MSMEs (Beschorner 2019; Tan 2022).

While the digital economy offers new opportunities for cross-border transactions among the ASEAN member states, it also raises considerable challenges for policy in a region where characteristics and regulatory differences between countries remain. The first challenge appears from the need for digital skills. Those with limited initial exposure to digital tools during the pandemic without appropriate digital skills did not experience the benefits of digitalization (WEF 2021). The digital skills and talent in ASEAN had the lowest score of 48.21 among the six pillars of the ASEAN digital integration index 2021, indicating a lack of a capable digital workforce risk is the most significant factor impeding digital integration and growth (ASEAN Secretariat 2021a). As a result, MSMEs have a high demand to improve digital literacy, provide digital skills training for MSME employees, and enhance the accessibility of quality internet and digital devices (WEF 2021). Nevertheless, the concentration of digital tool learners and teachers in big cities leaves small towns and rural areas at risk of being left behind in digitalization. It prevents the transfer of digital skills between generations.

Moreover, it is worth noting that the level of development in digital technology inclusivity in government and private sectors varies considerably across the ASEAN member states. This fact could be reflected by the e-government index and business-to-consumer (B2C) index. While Singapore (0.91), Malaysia (0.77), and Thailand (0.77) have very high e-government index values in 2022 (Table A7.1), the Lao People's Democratic Republic (Lao PDR) and Myanmar are still lagging with index values of 0.38 and 0.50, respectively. For the B2C index (Table A7.2), Singapore (94.4) and Malaysia (81.3) are at the top of the list, while Cambodia (31.1) and Myanmar (24) are relatively far behind. Deficiencies hinder Indonesia's B2C e-commerce in its logistics and payment systems, while Malaysia's internet service quality is a limiting factor. On the other hand, Thailand benefits from strong logistics capabilities but encounters issues with the quality of its internet services (Lee 2021).

Additionally, there are disparities in the readiness of countries to adopt and utilize e-payment systems. These gaps primarily stem from variations in regulatory and policy frameworks and the availability of innovative products and services (Chen and Ruddy 2020). For example, the portion of the population in Cambodia, Indonesia, the Lao PDR, Myanmar, and the Philippines who made a digital in-store

[2] See https://www.bangkokbank.com/en/Personal/Other-Services/Payment-and-Top-Up/CrossBorder-QRPayment

merchant payment using a mobile phone or made a digital merchant payment was still below 20% in 2021 (Table A7.3). This fact poses a challenge for the implementation of cross-border QR payment services. Another common challenge is that ASEAN member states are not all equally well equipped to deal with the privacy and security challenges that digital technologies can pose and have equal access to broadband networks as the essential infrastructure of the digital economy, resulting in lower adoption of these technologies, especially amongst MSMEs (Box and Lopez-Gonzalez 2017). MSMEs also face a more pronounced lack of familiarity with technological tools (ICC and Google 2022).

It is also important to note that the economic openness degree of ASEAN member states plays an important role in utilizing the digital economy, as the higher degree of economic openness for countries such as Singapore, Viet Nam, Malaysia, and Thailand indicate that digital trade is likely to be higher in these countries (Lee 2021). Therefore, the digital economy is at risk due to regulations and restrictions on digital trade. According to the OECD database, the digital services trade restrictiveness index of ASEAN members indicates a relatively open to foreign digital services (Table A7.4). However, for sector-specific restrictiveness, the services trade restrictiveness index for accounting in Thailand and legal in Indonesia is close to one, indicating almost they are entirely closed to foreign service providers in those sectors (Table A7.5). Aligned with the finding of the International Chamber of Commerce (ICC) and Google (2022), the regulatory environment and challenges in logistics act as significant barriers to exports, with half of MSME owners identifying foreign and domestic regulations, along with delays and high logistics costs related to customs clearance, as the primary obstacles to exporting.

Growing concerns regarding data privacy and security, among other factors, have prompted calls for more extensive and comprehensive regulation of the internet and its underlying data transfers. Governments are updating their data-related rules and implementing two measures: limitations on cross-border data transfers, primarily to safeguard privacy, and requirements for local data storage, either for audit purposes or to protect privacy (OECD 2019). Restrictions on data transfers can have trade implications, significantly, when they impact the movement of data that is essential for global value chain coordination or for MSMEs to engage in trade.

Data show that in the last 20 years (2004–2021), ASEAN's intra-trade has slightly decreased from 24.5% to 20.9% (Figure A7.3). This figure indicates that ASEAN has recently become more external regional dependency than inward region. The intra-investment (foreign direct investment [FDI]) inflows pattern has been more volatile than intra-trade, and ASEAN experienced one when the intra-investment share was above the intra-trade share in 2016. This figure confirms that ASEAN relies on its trade and long-run investment outside the region, primarily the East Asian countries, the United States, and European Union (EU).

In addition to the digital enthusiasm era, the world economy is entering the green economy era in which ASEAN's production and service networks must follow suit. The ASEAN member states must adopt green production networks of more renewable energy usage and low-carbon emissions since export destination countries like the EU have applied the so-called EU's Carbon Border Adjustment Mechanism as the import barriers for non-climate friendly products. They need to adopt green financing within their just energy transition and a transparent process in its process (Crystallin and Hinojales 2023). Another example of environment-friendly production is the regional production network of battery electric vehicles (BEV) in ASEAN member states. ASEAN countries are receptive to vehicle transition from fossil-fuel bases to electric ones (Jamaludin et al. 2021).

This chapter discusses the importance of a green economy for ASEAN economic cooperation amid the ASEAN member states' goals to transform its economy with the manufacturing sector as the backbone, which requires more energy and emits more emissions.

The Asian Development Bank (ADB) report "ASEAN and Global Value Chains: Locking in Resilience and Sustainability" published in March 2023 shows that ASEAN's economic backbone is in manufacturing, particularly backward participation. This fact proves Southeast Asia is one of the world's production bases. As several countries produce manufacturing products in production and value-chain networks, from an environment-friendly point of view, commitment to NZE must be equally distributed within involving countries.

Each member state has its carbon reduction commitment and targeted year for the deadline. This different target and year are typical, given ASEAN's economic divergence. ASEAN member states must adopt and apply the transparency principle of the UNFCCC to ensure that the country's commitment becomes the building block to achieving the global NZE target. Mainstreaming global commitment in COP to ASEAN's sustainability commitment and finally with transparency at the country level is the critical success factor to meet the NZE target. These objectives need government commitment from global, regional, to country levels.

Regarding gross domestic product (GDP) size, Indonesia is the biggest country in ASEAN and has the highest CO_2 emissions in the region. Indonesia's contribution to ASEAN's GDP increased from 30.8% in 2004 to 34.5% in 2019 (Table A7.6), which indicates its increasing contribution to emissions. Indonesia's commitment to the Paris Agreement is the game-changer for ASEAN's emissions reduction purposes. In 2017, Indonesia emitted CO_2 emissions of around 487 million tons, followed by Thailand at 331 million tons, Malaysia at 255 million tons, Viet Nam at 199 million tons, and the Philippines at 128 million tons, and the rest less than 100 million tons (ASEAN Secretariat 2021b).

Most ASEAN member states have an industrial sector of more than 20% per GDP, including Indonesia (see Table A7.7). The industry sector consists of manufacturing and construction. The higher the economic growth, the higher the industrial sector emissions. In the last 16 years before the global pandemic from 2004 to 2019, the biggest CO_2 contributor countries experienced magnificent GDP per capita jumps, such as Indonesia at around 3.6 times, Thailand at 2.9 times, Malaysia at 2.3 times, Viet Nam at awe-inspiring magnitude at 6.3 times, and Philippines at 3.1 times (Table A7.8). This income level jumping, and industrial sector dominance indicate that emissions also increased during the period.

ASEAN member states at the country level shows their commitment to reducing CO_2 emissions of Paris Agreement levels, with their own effort, such as Indonesia at 29%, Thailand at 20%, Malaysia at 45%, Viet Nam at 9%, and the Philippines at 2.71% (Table A7.9). This table shows that Brunei Darussalam and Viet Nam have the most sensitive impact of reducing emissions to decreasing GDP at 0.29% and 0.24%. In contrast to all countries that will lower their GDP, the Philippines shows the opposite: its GDP will increase by 0.07% when it applies NDCs at 2.71%. Indonesia, for instance, attempts to increase its GDP per capita in 2045 to $23.2 thousand, or around six times the current GDP per capita. If 20 years before, Indonesia's GDP per capita was $1,000, and now it is $4,000, an increase of four times in the last 20 years. It means in 20 years, compared to the previous 20 years, Indonesia will require 1.5 times more energy capacity. Amid its effort to commit to net-zero emissions in energy transformation and emissions reduction, Indonesia must have a strategic scenario that balances accelerating economic growth objectives with a greener yet higher-cost energy.

NZE has been implemented at the country level of the NDCs and low-carbon development initiative. Suppose ASEAN does not start from the beginning of the energy transition and CO_2 emissions reduction. In that case, ASEAN production network or a particular ignoring country will be at risk that their product will face an export ban before entering its trading partner. For instance, to enter the European Union market, the trading partner must fulfill the EU's requirements which refer to trade

and sustainable development.[3] The demand-driven circumstances making the change from brown to green and unrenewable to renewable worth it and timely. As investment from abroad, FDI comes from developed to developing countries, emissions from manufacturing need to share responsibility between the FDI home country and the FDI host country.

This chapter limits the discussion of the green economy to securing ASEAN economic growth on the track with the global transformation toward environment-friendly-led growth.

7.3 Existing Policy

At the regional level, ASEAN has concluded various agreements and policies to promote the digital economy and cross-border transactions. The ASEAN Digital Integration Framework and its Action Plan[4] serves as a comprehensive blueprint for digital integration efforts, covering areas such as trade facilitation, data flows, electronic payments, entrepreneurship, and talent. Furthermore, the Bandar Seri Begawan Roadmap, issued in 2021, focuses on accelerating ASEAN's economic recovery and digital economy integration in response to the challenges posed by the COVID-19 pandemic. Additionally, the Masterplan on ASEAN Connectivity 2025 recognizes the importance of backbone infrastructure, regulatory frameworks for new digital services, sharing best practices on open data, and equipping MSMEs with the necessary capabilities to leverage new technologies and enhance digital connectivity (ASEAN Secretariat 2016).

The ASEAN Data Management Framework and Model of Contractual Clauses for Cross-Border Data Flows are crucial in digital data governance. The Data Management Framework guides businesses in establishing effective data management systems that include data governance structures and safeguards.[5] In contrast, the Model of Contractual Clauses offer standardized contractual terms and conditions that can be integrated into legally binding agreements when businesses transfer personal data across borders. These clauses streamline negotiations, reduce compliance costs and time that particularly benefit small and medium-sized enterprises (SMEs), and ensure personal data protection during cross-border transfers. Moreover, the ASEAN framework on Digital Data Governance, adopted in 2017, establishes regulatory guidelines to facilitate the free flow of data within the region while upholding necessary data protections during transfers, encouraging a dynamic data ecosystem.

The ASEAN Work Programme on Electronic Commerce addresses various aspects of digital trade, including consumer protection, the security of electronic transactions, and payment systems. It focuses on essential areas such as trade facilitation, education and technology competency, electronic payment and settlement, online consumer protection, cybersecurity, and logistics to enhance e-commerce. Moreover, the ASEAN Digital Masterplan 2025 offers a comprehensive roadmap for ASEAN member states to improve their citizens' participation in the digital economy, highlight the importance of developing advanced digital skills as a critical intervention, and set a direction to achieve digital inclusivity within the ASEAN community by improving access to digital technologies for people across the region (ASEAN Secretariat 2021a).

[3] See https://policy.trade.ec.europa.eu/development-and-sustainability/sustainable-development/sustainable-development-eu-trade-agreements_en.

[4] See https://asean.org/our-communities/economic-community/asean-e-commerce/key-documents/.

[5] See https://www.pdpc.gov.sg/help-and-resources/2021/01/asean-data-management-framework-and-model-contractual-clauses-on-cross-border-data-flows.

Regarding trade facilitation, the ASEAN Single Window (ASW) is a regional platform enabling the electronic exchange of shipment information among the 10 Southeast Asian countries. The ASW integrates the National Single Windows of ASEAN member states, promoting seamless data exchange between them. However, the full adoption of the ASEAN Customs Declaration Document (ACDD), an electronic document facilitating the exchange of export declaration information between member states, is yet to be achieved by all countries. Utilizing the ACDD could reduce clearance time for import consignments. However, it is an optional system for traders exporting goods to ASEAN member states ready for exchange, including Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, and Thailand. A recent trade facilitation initiative is the Initiative for ASEAN Integration Work Plan IV (ASEAN Secretariat 2020a), which aims to enhance standards harmonization, facilitate trade, and promote e-commerce within ASEAN. It focuses on implementing trade facilitation measures, improving technical capacity, and strengthening legal frameworks for e-commerce.

At the country level, ASEAN member states have different policy priorities for the digital economy and cross-border transactions, according to International Trade Administration. For instance, Thailand focuses on digital infrastructure with the Thailand Industry 4.0 policies (Kohpaiboon 2020), including constructing a broadband network for all villages. Singapore emphasizes digital economy agreements to support businesses, particularly SMEs, in digital trade.[6] Indonesia prioritizes digital infrastructure to enhance internet access, promoting digital government such as through the e-government system (*Sistem Pemerintahan Berbasis Elektronik*) and empowering digital skills through various initiatives, for example, the National Movement on Digital Literacy and the Digital Talent Scholarship program. Digital cross-border transactions are also regulated by the Minister of Trade Regulation No. 50/2020,[7] which covers requirements for business licenses and the appointment of Indonesian representatives by foreign e-commerce businesses.

As one of the global production network regions, the ASEAN economy relies on manufacturing, particularly in backward participation. Unlike the agriculture and service sectors, manufacturing will consume much more energy. As mentioned, Indonesia will need to accelerate its GDP per capita six times higher from 2023 to 2045. This acceleration will see an increasing role of manufacturing, meaning it will consume more energy than before. Indonesia requires more energy, but must fit the energy transition objective of using environment-friendly renewable energy.

The world has been transformed from unrenewable brown energy to more expensive renewable green energy. The production network in ASEAN must consume more renewable energy, increasing production costs, but in an attempt to boost economic growth. However, if ASEAN member state does not adjust to adopt energy and green economic approach, their product will face a demand drop. Complying with energy transition and emissions management is more expensive than the current situation, but this demand-driven era is necessary for achieving sustainable-environment-led growth in the context of regional manufacturing production networks. All manufacturing products are produced over the production network, which involves FDI home countries from developed and FDI host countries in ASEAN. The key word is sharing responsibility between home and host FDI countries to create greener regional value chains (RVCs) in Southeast Asia as a production-based region.

[6] See https://www.mti.gov.sg/Trade/Digital-Economy-Agreements.

[7] See https://jdih.kemendag.go.id/peraturan/detail/2000/2.

7.4 Policy Recommendations

Despite the implementation of regional and country-level policies, there are still gaps in practice that need to be addressed within ASEAN member governments. This chapter promotes several policies to fulfill the gap between current and expected outcomes:

The ASEAN Way fits ASEAN economic integration characteristics which require an "unconditional free" relationship towards the partner's country. This principle holds with ASEAN's inclusive principle for digital economic transformation and stable regional economic cooperation. The open and convergence are matched with the ASEAN Plus framework and ASEAN common market. The first principle attempts to transform regional economic cooperation from intra-trade to intra-investment, and the second principle applies to achieving the ASEAN common market, which adopts rule-based economic integration. These principles secure ASEAN to face opportunities and challenges in the new digital and green economy era.

Promoting data sharing with adequate protection and security measures. To achieve this, one effective approach might be adopting a data transfer mechanism such as the standard contract clauses used in the EU as a reliable legal platform for regional data sharing under the existing ASEAN policies on digital data governance. The data transfer mechanism might summarize sets of contractual responsibilities and conditions to ensure that the transferred data receives the same level of protection as required by the regulations. By utilizing standardized templates, this mechanism streamlines the agreement process rapidly and more efficient for specific data flows. Hence, building trust and commitment among ASEAN member state governments is crucial for enabling data sharing.

Streamlining regulations governing the adoption of new technologies in digital payment systems in response to the evolving digital industry landscape. Considering certain ASEAN members have not implemented common digital payment systems such as the QR payment, implementing harmonized digital payment system regulations at the regional level across ASEAN member countries might be a practical strategy to embody the action while ensuring a coherent method to manage digital payment and transaction innovations.

Offering guidance to MSMEs on leveraging digital tools and technologies for exports. Addressing the knowledge gap within the MSME community by providing tailored support can enhance their skills and capabilities.

Enhancing digital literacy and upskilling programs for the younger generation to meet the demands of employers and prepare citizens and businesses for the rapidly evolving digital landscape. Collaborating with the private sector to design relevant digital skills roadmaps and accelerating their implementation in prioritized sectors is essential.

Demand-driven by increasing awareness of developed country's consumers on environment-friendly products will significantly affect developing country's export supply. This change will put developing country products at risk if it does not accommodate energy transition and emissions reduction schemes. ASEAN member states must balance increasing economic growth with the manufacturing sector, which consumes more energy and emits more emissions with cleaner energy and low-carbon emissions.

Demand creates its own supply. Increasing awareness of environment-friendly products makes the production networks, including ASEAN's regional production network to be environmentally sensitive. There is sharing responsibility between the developed home country of FDI and the developing host

country of FDI to establish green RVCs in Southeast Asia. ASEAN is essential in this region's green economic chain context.

The actual example of the green RVCs in ASEAN is on the recent occasion of the 42nd ASEAN Summit held on 10–11 May 2023 in Labuan Bajo, Indonesia, the ASEAN head of state officially signed the commitment to the ASEAN Leaders' Declaration on Developing Regional Electric Vehicle Ecosystem (ASEAN Secretariat 2023). In this document, ASEAN's leaders emphasized that electric vehicles are part of ASEAN's efforts to reduce greenhouse gas emissions, adopt NZEs, support energy transition and transition toward clean transport, and enhance green RVCs. The ASEAN Economic Community Council supervises this commitment implementation.

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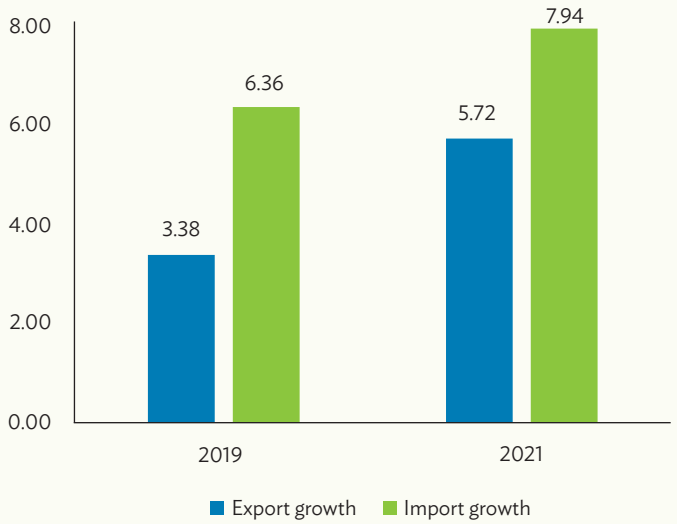
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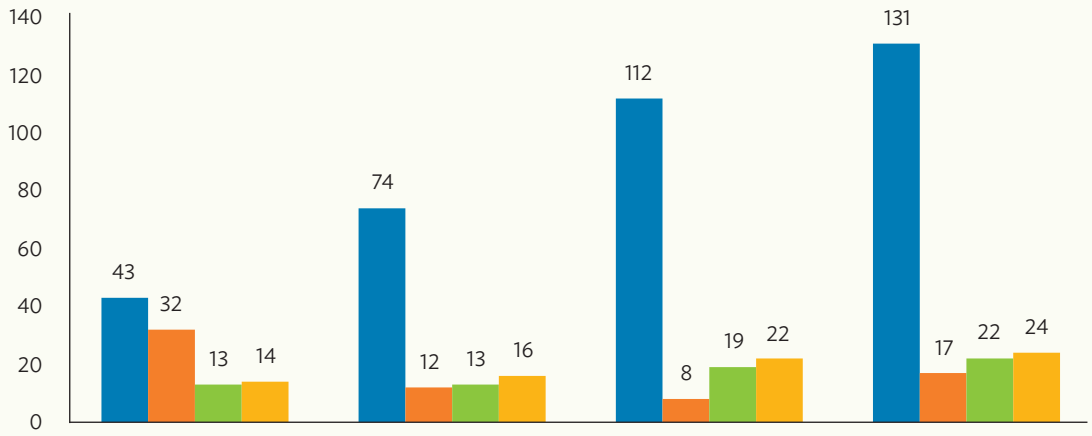
Appendix

Figure A7.1: Average International Trade in Digitally Deliverable Services Growth of Six ASEAN Member States
(%)



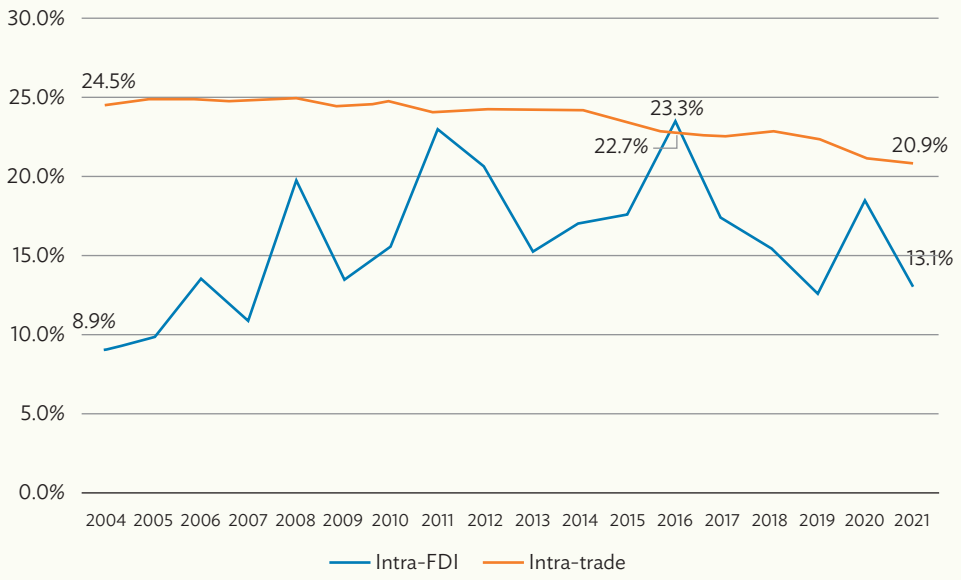
Source: UNCTAD STAT. https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=158358 (accessed 15 May 2023).

Figure A7.2: Digital Economy Gross Merchandise Values of Six ASEAN Member States
($ billion)



Source: Google, Temasek and Bain & Company (2022).

Figure A7.3: ASEAN's Intra-Trade and Intra-Investment 2004–2021 ($ billion)



FDI = foreign direct investment.

Sources: ADB. 2022. Economic Research and Regional Cooperation Department. ADB for Intra-Trade and ASEAN Statistical Yearbook for Intra-Investment.

Table A7.1: E-government Development Index

Country	E-government Development Index	Online Services	Telecommunication Infrastructure Index	Human Capital Index	Overall Classification
Singapore	0.913	0.962	0.876	0.902	Very high inclusivity
Thailand	0.766	0.776	0.734	0.788	Very high inclusivity
Malaysia	0.774	0.763	0.795	0.765	Very high inclusivity
Brunei Darussalam	0.727	0.587	0.837	0.757	High inclusivity
Indonesia	0.716	0.764	0.640	0.744	High inclusivity
Viet Nam	0.679	0.648	0.697	0.690	High inclusivity
Philippines	0.652	0.630	0.564	0.763	High inclusivity
Cambodia	0.506	0.418	0.561	0.538	High inclusivity
Myanmar	0.499	0.307	0.608	0.583	Middle inclusivity
Lao PDR	0.376	0.301	0.282	0.547	Middle inclusivity

Lao PDR = Lao People's Democratic Republic.

Source: UN E-Government Knowledgebase. https://publicadministration.un.org/egovkb/en-us/Data-Center (accessed 15 May 2023).

Table A7.2: B2C Index

Economy	Secure Internet Servers (normalized, 2019)	2020 Index Value	Index Value Change (2019–20 data)
Singapore	94	94.4	–0.4
Malaysia	71	81.3	–2.1
Thailand	59	76	2
Viet Nam	64	61.6	0.8
Indonesia	60	50.1	0
Philippines	39	44.7	–5.1
Lao PDR	30	40.6	5.4
Cambodia	42	31.1	0.3
Myanmar	22	24	–2.9

B2C = business-to-consumer, Lao PDR = Lao People's Democratic Republic.

Note: Data not available for Brunei Darussalam.

Source: UNCTAD B2C E-Commerce Index (2020).

Table A7.3: Selected Indicators of The Global Findex Database (2021)

Economy	Made or Received a Digital Payment (%, age 15+)	Used a Mobile Phone or the Internet to Buy Something Online (%, age 15+)	Made a Digital In-Store Merchant Payment Using a Mobile Phone (%, age 15+)	Made a Digital Merchant Payment (%, age 15+)
Cambodia	26%	4%	1%	3%
Indonesia	37%	18%	6%	13%
Lao PDR	21%	10%	6%	9%
Malaysia	79%	50%	25%	50%
Myanmar	40%	20%	10%	16%
Philippines	43%	36%	12%	18%
Singapore	95%	58%	50%	83%
Thailand	92%	51%	57%	63%
Viet Nam	46%	40%	18%	24%

Lao PDR = Lao People's Democratic Republic.

Note: Data not available for Brunei Darussalam.

Source: World Bank Global Findex Database. https://www.worldbank.org/en/publication/globalfindex/Data (accessed 13 May 2023).

Table A7.4: Digital Services Trade Restrictiveness Index

Economy	2014	2022
Brunei Darussalam	0.232	0.232
Cambodia	0.404	0.405
Indonesia	0.307	0.307
Lao PDR	0.523	0.499
Malaysia	0.127	0.127
Philippines	0.127	0.127
Singapore	0.203	0.200
Thailand	0.141	0.141
Viet Nam	0.106	0.146

Lao PDR = Lao People's Democratic Republic.

Note: Data not available for Myanmar.

Source: OECD Database. https://stats.oecd.org/Index.aspx?DataSetCode=STRI_DIGITAL (accessed 17 May 2023).

Table A7.5: Services Trade Restrictiveness Index for Selected Sectors and ASEAN Member States (2022)

Economy	Logistics Cargo Handling	Logistics Storage and Warehouse	Logistics Freight Forwarding	Logistics Customs Brokerage	Accounting	Legal
Indonesia	0.424	0.362	0.325	0.290	0.698	0.920
Malaysia	0.256	0.230	0.252	0.255	0.283	0.653
Singapore	0.285	0.292	0.282	0.239	0.203	0.325
Thailand	0.428	0.472	0.385	0.378	1.000	0.580
Viet Nam	0.427	0.303	0.264	0.268	0.251	0.569

Source: OECD Database. https://stats.oecd.org/Index.aspx?DataSetCode=STRI_DIGITAL (accessed 17 May 2023).

Table A7.6: ASEAN Member States' GDP Size (Current $)

	2004	Rank	2019	Rank
Indonesia	30.8%	1	34.5%	1
Malaysia	14.9%	3	11.3%	5
Thailand	20.7%	2	16.8%	2
Singapore	13.8%	4	11.6%	4
Brunei Darussalam	0.9%	8	0.4%	10
Lao PDR	0.3%	10	0.6%	9
Cambodia	0.6%	9	0.8%	8
Viet Nam	5.4%	6	10.2%	6
Myanmar	1.1%	7	2.1%	7
Philippines	11.4%	5	11.6%	3

GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' calculation based on data from ADB's Key Indicators Database. https://kidb.adb.org (accessed 20 May 2023).

Table A7.7: ASEAN Member States' GDP Proportion by Three Biggest Sectors

	Agriculture % GDP	Industry % GDP	Service % GDP
Indonesia	13.3	40.6	46.1
Malaysia	7.3	37.9	54.8
Thailand	8.1	31.1	60.8
Singapore	0.0	25.4	74.6
Brunei Darussalam	1.0	61.5	37.5
Lao PDR	18.0	35.4	46.6
Cambodia	22.1	36.5	41.4
Viet Nam	15.5	38.3	46.2
Myanmar	21.4	38.0	40.7
Philippines	8.8	30.3	60.9

GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' calculation based on data from ADB's Key Indicators Database. https://kidb.adb.org (accessed 20 May 2023).

Table A7.8: ASEAN Member States' GDP Per Capita Change (Current $)

	2004	2019	Change (%)
Indonesia	1,150	4,135	3.6
Malaysia	4,952	11,433	2.3
Thailand	2,660	7,814	2.9
Singapore	27,609	65,831	2.4
Brunei Darussalam	21,902	31,086	1.4
Lao PDR	418	2,614	6.3
Cambodia	409	1,643	4.0
Viet Nam	547	3,425	6.3
Myanmar	193	1,271	6.6
Philippines	1,121	3,485	3.1

GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' calculation based on ADB data (accessed 23 May 2023).

Table A7.9: NDCs and GDP Impact Change

	NDCs	GDP	Change (%)
Indonesia	–29%	–1.84%	0.06
Malaysia	–45%	–1.95%	0.04
Thailand	–20%	–0.22%	0.01
Singapore	–36%	–3.62%	0.10
Brunei Darussalam	–20%	–5.86%	0.29
Lao PDR	–60%	–1.49%	0.02
Cambodia	-41.7%	–3.85%	0.09
Viet Nam	–9%	–2.14%	0.24
Myanmar	NA	NA	NA
Philippines	–2.71%	0.20%	–0.07

GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, NA = not available, NDC = Nationally Determined Contribution.

Source: Asian Development Bank (2023).

CHAPTER 8

Innovative Finance for Transforming Sustainable Food Security Systems in the ASEAN Region

Tapan Sarker, Jatin Trivedi, Dipanwita Chakraborty, and Sana Bashir

8.1 Introduction

The food security system (FSS) is vulnerable in urban areas and ineffective in rural areas in the Association of Southeast Asian Nations (ASEAN) region and is heavily dependent on imports. The current food system needs reviewing and reframing to establish sustainable links between agricultural food production and a reliable, high-quality-supply chain network to build a sustainable FSS. The timely availability of healthy food is a global concern and depends on food security to retain its nutritional value. The continuous rise in the population questions the existing availability of food, and the novel coronavirus disease (COVID–19) pandemic explained the resilience of the existing food system. FSS resilience contributes a key role in the stability of a healthy economy (Mina and Kumar 2021). Pandemic events such as COVID-19 form direct interventions on the FSS, for instance, strict restrictions to curb the spread of the pandemic, wedged obtainability and cost of firm inputs, labor, and supply chain networks in Africa (Nchanji et al. 2021). Agriculture yield compromise impacted directly on socioeconomic food habits, food supply disruptions, and local supply networks with a greater impact on countries with poor FSS (Béné et al. 2021; Boughton et al. 2021; Mardones et al. 2020; Nchanji et al. 2021; Nchanji and Lutomia 2021; Rivera-Ferre et al. 2021; Saboori et al. 2022). Such a pandemic situation helps identify inefficiencies in agriculture production capacity, storage and distribution systems, local supply networks, accessibility, and availability of food to mitigate hunger. Agriculture land area is impossible to increase, rather it is decreasing to develop commercial and residential areas to accommodate the population (Sharif and Irani 2016). Food security has become a priority concern and several institutions such as the United Nations, ASEAN, the Food and Agriculture Organization, and the Asia-Pacific Economic Cooperation forum are developing specific alternatives to develop a sustainable FSS. The Asian Development Bank (ADB) announced long-term food security in Asia and the Pacific as a priority to ease the ongoing food crisis (ADB 2022)..

ASEAN member states jointly structured the ASEAN Integrated Food Security framework and formulated two strategic plans of action in 2009–2013 and 2015–2020 to ensure long-term food security and improve the livelihoods of farmers in ASEAN countries. Later, the framework continued beyond 2020 and extended to 2025 with several primary focuses such as long-term food security and nutrition; ASEAN countries' engagement in food production, processing, and trade; transfer of new technology, knowledge sharing and enhancing efficiency in promoting food security in the ASEAN region. Sustainable and improvised food security, plummeting farm losses by various means, especially in countries with low income and high levels of food insecurity are likely to have a positive impact on innovative finance schemes. Moreover, control over food losses and waste increases the accessibility of food for the needy in the ASEAN member states. The rising populations in ASEAN has intensified agriculture production. Therefore, restructuring the existing food security system into a sustainable FSS with innovative finance schemes, public–private partnerships, and interconnected food production and supply chain networks will contribute to the food sustainability of ASEAN countries.

This study solely considered ASEAN member nations for the elucidation of matters pertaining to food malnutrition However, in this chapter, we propose a SAM–SSIS model[1] that will provide policy solutions and action plans capable of involving public–private innovative finance further: the model can be generalized to any emerging or developing economy.

8.2 Literature Review

A FSS is not immune to climate change and other hazards, principally pretentious by environmental conditions. Unexpected changes in climate conditions such as heat, rainfall, floods, or excess carbon emissions tend to affect total crop yield and result in lesser quantity than projected. This will increase the hidden cost of social consumption, which is a permanent loss for that time. The issue has been a concern for over 30 years, but the exponential rise in population escalated the original primary requirements. Currently, at least 9% of the ASEAN member states' population is undernourished. That is approximately 61 million, of which about 33 million face severe insecurity for healthy food (FAO 2018). The number is increasing day by day with the increase in the population. Global innovative finance is the only option that can support emerging ASEAN countries to restructure the FSS at a large and self-sustainable scale. Innovative finance can support the formulation of specific action plans. A systematic survey/study provides primary information to identify and map food consumption and production gaps in urban food systems (Jensen and Orfila 2021) and rural and isolated areas. Smart agriculture can be planned, including restructuring the irrigation system, which supports the Food Security Policy (Kesuma, Maryunianta, and Muda 2018). The use of biofuel has also been found to be effective in enhancing the efficiency of agricultural food product warehouses (Martínez-Jaramillo, Arango-Aramburo, and Giraldo-Ramírez 2019), alongside the modern infrastructure and the redesigned humanitarian supply-chain network that has been established (Biswal, Jenamani, and Kumar 2018). As with innovative finance, ASEAN member countries can develop a specialization in food production that will impact global sustainability (Campi, Dueñas, and Fagiolo 2021).

8.2.1 ASEAN Food Security Challenge

The ASEAN economies are committed to achieving equitable and dynamic growth while pursuing the shared objective of attaining sustainable food security. According to Shair et al. (2021) and Liu, Zhang, and Bae (2017), these economies are predominately agriculture dependent. The World Bank divides the ASEAN region into three economic groups. Group 1 comprises Singapore, Malaysia, and Brunei Darussalam, with gross domestic product (GDP) per capita ranging from $53,000 to $10,000. Group 2 includes Thailand, Indonesia, and the Philippines, with GDP per capita ranging from $6,000 to $3,000. Group 3 comprises the Lao People's Democratic Republic, Cambodia, Myanmar, and Viet Nam, with GDP per capita ranging from $2,500 to $1,000 (World Development Indicators). These metrics of GDP per capita demonstrate ASEAN's significant role as a global provider of diverse agricultural and culinary products. Notably, Thailand and Viet Nam are two of the largest exporters of rice in the globe. As exporters of sugar, coconut, coffee, pulse grain, cassava, and pineapple, the Philippines, Indonesia, and Myanmar claim a substantial share of the market (ASEAN 2023). Even though ASEAN is a significant contributor to global food production, ensuring food security remains a challenge (FAO 2018; Desker, Anthony, and Teng 2013). Despite extensive regional efforts and the existence of numerous food security frameworks and systems, such as the ASEAN Integrated Food Security Framework, the ASEAN Food Security Information System, the ASEAN Plus Three Emergency Rice Reserve, and the ASEAN Strategic Plan of Action on Food Security, the region continues to struggle

[1] SAM–SISS: S = Smart Agriculture, A = Agri-tech Sustainability, M = Modern, High-tech Infrastructure, S = Smart, Reliable, Sustainable Storage, S = Smart Transport and Logistics Supply, I = Innovative Farming Technology, S = Sustainable Supply Chain Network.

with persistent rates of undernourishment and food insecurity. Food security is a global challenge, and previous research has exhaustively analyzed the numerous food security systems and approaches in ASEAN (ASEAN 2020). Existing food security systems continue to have flaws that impede their ability to effectively address the challenge of food security and impede the advancement of food production. This study seeks to fill the void in current food security systems by utilizing innovative finance as a crucial instrument capable of stimulating and achieving sustainable food security systems.

8.2.2 COVID-19 and ASEAN Food Security System

The COVID-19 pandemic has been referred to as a "black swan" occurrence because of its potentially devastating effects on the economy across the world. There were approximately 7 million individuals in the ASEAN region who faced severe food insecurity as a direct result of the pandemic, according to statistics compiled by both the FAO and the World Bank (FAO 2020; World Bank 2020b). This is a very concerning figure. In addition to this, the pandemic wreaked havoc on a massive scale on agricultural systems and food distribution networks around the world. According to Baldwin and Freeman (2020), these disruptions were caused by issues such as supply shortages, border closures, limits on internal travel, unemployment, farmer sickness during harvest, inadequate capital for food production, and population lockdowns. It is important to note that these disruptions are not limited to the agricultural market alone; rather, they affect many different sectors of the global food market, most notably the aquaculture market (Marschke et al. 2020; Love et al. 2021; Kakoolaki et al. 2020; Kumaran et al. 2021; Stokes et al. 2020; Bennett et al. 2020; Campbell et al. 2021). The outbreak of the COVID-19 pandemic made pre-existing risks to the food security system in Southeast Asian economies much more severe. This system was already under strain as a result of the catastrophic drought that the region had been experiencing. The pandemic brought to light the weaknesses of the FSS and sowed seeds of doubt over the success of the program (ASEAN 2020). In addition, the conflict between the Russian Federation and Ukraine has further exacerbated the difficulties already faced by nations who are attempting to cope with the effects of climate change and COVID-19. It is projected that this conflict, in conjunction with disruptions in the global commodities market, would contribute to an increase in both levels of poverty and food insecurity (Monteclaros, Luis, and Caballero-Anthony 2022; Boughton et al. 2021). Fertilizer exports were dominated by the Russian Federation, which was responsible for 49% of the world's ammonium nitrate fertilizer production and contributed 49% of the world's potash fertilizer supply. Nevertheless, the conflict has caused prices of food, fertilizers, and fuel to rise, as well as limitations on exports. These improvements increased the likelihood of food instability and malnutrition occurring around the globe. As a result, the following events had an impact on income around the world, as well as food security, food nutrition, people's livelihoods, and their overall well-being.

8.2.3 Financing for Sustainable Food Security Systems

Agricultural finance is crucial to establishing a sustainable food security system (Adegbite and Machethe 2020). The traditional food financing systems in ASEAN countries are inadequately outfitted to support agricultural transitions and agri-food industries (World Bank 2022). The provision of resources by microfinance institutions and banks to this sector is constrained due to the significant difficulties associated with managing unique agricultural risks and the high transaction costs associated with engaging a large number of small-scale farmers and micro, small, and medium-sized enterprises (MSMEs). This section of the literature examines the effect of public and private funding on the development of sustainable food security systems.

Public Financing for Small-Scale Rural Farmers

Sustainable agriculture public finance is shaped by a range of factors, encompassing measures to mitigate the rise in agriculture inputs prices, provision of credit support to empower women in rural areas, microfinancing banking to support small farmers, financial inclusion, and subsidies to assist. For instance, Osabohien (2020) and Osabohien Adeleye, and Alwis (2020) have underscored the challenge of limited credit access, as financial institutions perceive the agriculture sector as volatile and risky. Consequently, banks and other financial entities are reluctant to finance agricultural projects, leading to stringent credit conditions. Likewise, prior studies emphasized the pivotal role of credit as an indirect input for enhancing agricultural productivity (Sriram 2007; Das, Senapati, and John 2009; Chisasa and Makina 2013). Given the prevalence of small and marginalized farmers with fragmented land holdings in ASEAN countries, access to credit assumes critical importance for their investments. With lower savings rates in these economies, farmers often face inadequate equity and rely on external borrowing. However, modernization and mechanization in farming systems amplify the necessity of credit and microfinancing in the ASEAN region (Singh and Singh 2001). In the absence of affordable and timely credit from formal sources, farmers are often compelled to seek loans from noninstitutional lenders, resulting in high-interest rates (Chaudhuri, and Gupta 1996; Arshad 2022). Therefore, transitioning toward sustainable agriculture and food security is not a straightforward process and necessitates the facilitation of farmers through the provision of subsidies (Kaplinsky and Morris 2003; Mendoza 2008). Moreover, previous research has shown that ASEAN member countries have successfully implemented various agricultural support programs aimed at increasing productivity in rural areas (Tobias 2019). These programs include the Rice Paddy Payment Program (RPPP) in Viet Nam, the Rice Farmer Financial Assistance Program in the Philippines, the Rice Pledging Scheme in Thailand, and the Fertilizer Subsidy Program in Indonesia.

These initiatives have been recognized as effective means of enhancing agricultural productivity among small-scale family farms within the ASEAN economies (Catelo, Catelo, and Mina 2017). Furthermore, the establishment of Rural Banks in ASEAN has been highlighted as a crucial factor in promoting and expanding agricultural productivity and security. These banks play a vital role in providing essential financial services, including loans, credits, and subsidies, specifically tailored to the needs of small-scale farmers in rural regions of ASEAN (Catelo, Catelo, and Mina 2017). However, despite efforts to liberalize the financial sector and provide credits and subsidies to support small farmers, there are still limitations and challenges. The operations of foreign banks in the region, particularly rural banks, remain restricted in scope.

Additionally, digital financing options have not been adequately explored for the benefit of small farmers. Moreover, the existing subsidies are insufficient to effectively address the challenges faced by the food security system, highlighting the need for further improvements in the existing security measures.

Public Financing for Sustainable Food Supply Chain

Establishing a sustainable food security system requires the development of a sustainable food supply chain. However, the existing food security system in ASEAN lacks an efficient and cost-effective food transport and logistics infrastructure, especially in remote rural areas (Kaiser and Barstow 2022). This deficiency poses a hindrance to achieving a sustainable food supply chain. According to Coyle (2005) and Llanto (2012) transportation introduces multiple risk and vulnerabilities to the food system, however, investing in new or upgraded infrastructure yields similar benefits to removing general taxes. Such investments reduce transportation costs for marketing products and procuring inputs, diminish the likelihood of post-harvest losses by enhancing the quantity and quality of transport services,

and ultimately lead to higher returns for producers and lower food costs for consumers. Extensive research underscores the importance of transportation and logistics in ASEAN and includes studies by Fan et al. (2012), Kusano (2019), Chandra and Kinasih (2013), and Brooks (2010). Additionally, Wailes and Chavez (2012) stated that despite being the largest rice exporter, ASEAN only exports 4%–5% of the global rice production, because of inadequate rural road access, insufficient road construction, and limited reach to remote production areas. Consequently, facilitating farmers' access to markets requires investment in rural road construction and maintenance as part of efforts to establish a sustainable food security system.

Public Financing for Agricultural Innovation and R&D

Recent studies have shown that innovation in the agricultural sector often yields positive and significant returns (Cirera and Maloney 2017; Maloney 2014). South Asian economies have recognized the challenges faced by the agri-food system and have acknowledged the importance of agricultural innovation in their economic progress (World Bank 2013). In reference to agricultural innovation and research and development (R&D), several studies have highlighted agriculture innovation in ASEAN. These examples include the development of small farm machinery, the implementation of green revolution technology packages, the establishment of the cassava starch industry in Thailand, the transformation of the Thai poultry sector into a leading poultry exporter, and the collaborative development of a vitamin-rich golden rice variety through public–private R&D partnerships (World Bank 2012). Despite the region's adoption of innovations, various potential inventions among scattered smallholders continue to encounter challenges. Farmers' selection of new varieties to replace older ones is a reflection of their perception that the new varieties offer improvements (Evenson and Gollin 2003; Qian et al. 2020; Zhang et al. 2018). However, low revenue presents hurdles for farmers in terms of investing in agricultural technologies and improving productivity and food security (Haojie 2022). As a result, it is imperative to provide financing for agriculture and innovation in these fields which can act as a catalyst for agricultural innovation and R&D. Recent studies by Adegbite and Machethe (2020), Matthew et al. (2019), and Mugaambiwa and Tirivangasi (2017) highlighted the significant role agricultural innovation plays in promoting sustainability and food security. These studies have emphasized the importance of farmers› knowledge of current technologies, farming methods, and basic supplies like seeds, fertilizer, and feed for livestock in enhancing the quantity and quality of crops and livestock produced. Furthermore, the importation of sophisticated technology and the efficient use of agricultural resources assist in maintaining high levels of crop and livestock output, assuring the agriculture sector›s long-term contribution to the domestic economy, and helping to achieve a sustainable food security system.

8.2.4 Role of Insurance in Sustainable Food Security System

Bresche (2010) defines insurance as an economically viable technique for dealing with the economic impacts of climate change and controlling risks in the economy. Its use is not limited to cities; rural areas also benefit greatly from it. The provision of agricultural insurance encourages farmers to use formal financing, resulting in improved agricultural operations and increased profitability (Mia et al. 2015). ASEAN communities encounter challenges in establishing sustainable food security systems such as limited profitability, farming instability, reliance on weather conditions, insufficient irrigation infrastructure, and market price processes (Perevozora et al. 2023). Incentives and extended initiatives for rural farmers are required to address these issues and realize sustainable food security systems (Yorobe, Luis, and Burgos 2015). With public sector initiatives and public–private collaboration, ASEAN countries exhibit diverse insurance systems that offer coverage for agricultural products, farm equipment, arable land, livestock, aquaculture, and poultry. Small-scale farmers are hindered by the expensive insurance rates, though. Hence, accessible and innovative financing is required to

ensure insurance availability for all farmers. Collaboration in research, training, institution building, knowledge sharing, and awareness raising is crucial for developing a competitive insurance market that offers cost-effective support services.

8.3 Discussion and Policy Recommendations

Food markets are integrally volatile due to high differences in demand and available supply. Climate change conditions directly impact quantity yield. Further, economic conditions such as inequality in purchasing power parity crisis and health shocks also affect availability and food consumption (Mendoza 1996). These risks are expected to increase, and the only possible alternative is the transformation of existing FSS to sustainable and high-quality FSS (FAO 2019).

The World Food Summit in 1996 embraced four fundamental pillars of food security: physical availability (production and supply chain network), economic and physical access (economic means of purchase-availability), use (food quality-nutrition), and stability of supply (protection against climate change) (World Bank 2021; FAO 2021; Peng and Berry 2019). There have been various action plans developed based on details by the FAO on the prevalence of undernourishment and the scale of food insecurity released in 2016 and 2018, respectively (FAO 2016, 2018). Policy makers have identified notable inadequacies within the current food security system (FSS) amidst the pandemic, which is supported by a range of studies. The Organisation for Economic Co-operation and Development (OECD) (2020) reported a reduction in the presence of rural farmers amidst the pandemic, whereas Rabobank (2020) and the Agriculture Market Information System (AMIS 2020) directed their attention toward the seed and fertilizer industry, emphasizing the unfavorable consequences of seed and fertilizer scarcities on agricultural output in ASEAN, where feasible substitutes were not easily obtainable. Schmidhuber and Qiao (2020) as well as the OECD (2020) have underscored the impact of inadequate transportation and logistics on local and global supply chains, thereby exacerbating the difficulties encountered by farmers in establishing connections with markets and buyers. Sharma-Khushal (2020) observed that insufficient access to cold chains had a detrimental impact on the dairy and fish value chains, leading to substantial food and nutrient losses. Furthermore, the lack of a credit market in rural areas had negative consequences for agricultural producers. ASEAN has implemented the ASEAN Comprehensive Recovery Framework (ACRF) as a measure to address the effects of the pandemic and guarantee the durability of the food security system. The proposed framework involves the creation of regional food value chains, intending to reduce disruptions in the transportation and logistics of food within the region. The framework also seeks to ensure the provision of sustainable, affordable, and safe food that meets dietary needs. Additionally, the framework includes the effective implementation of the ASEAN plus Three Rice Emergency Rice Reserve and the ASEAN Food Security Information System to mitigate excessive price fluctuations and improve the resilience of the supply chain. In addition, there is a contemplation of pioneering resolutions such as digital technologies in the domains of agricultural production and consumption, as indicated by sources such as IFPRI (2020) and PC and FIA (2020). The current pandemic has provided a chance to proactively prepare for comparable occurrences in the future and establish suitable reactions (Barrett 2020). This highlights the crucial necessity to reorganize the current food security framework in the area. The study will focus on the insufficient attention given to financial innovation in the existing framework.

Public funding assists the ASEAN community in the following ways. First, it provides small-scale rural farmers with credit, financial services, and incentives, facilitating their access to capital for agricultural activities (Marina 2015). Second, it supports the transportation and logistics system, enhancing the efficacy of the agricultural supply chain (Hu, Gu, and Wu 2021). Third, it allocates funds for agriculture innovations, research, and development, thereby fostering technological advancements and sustainable agricultural practices (Vo and Ngo 2021). Finally, public finance supports the food market

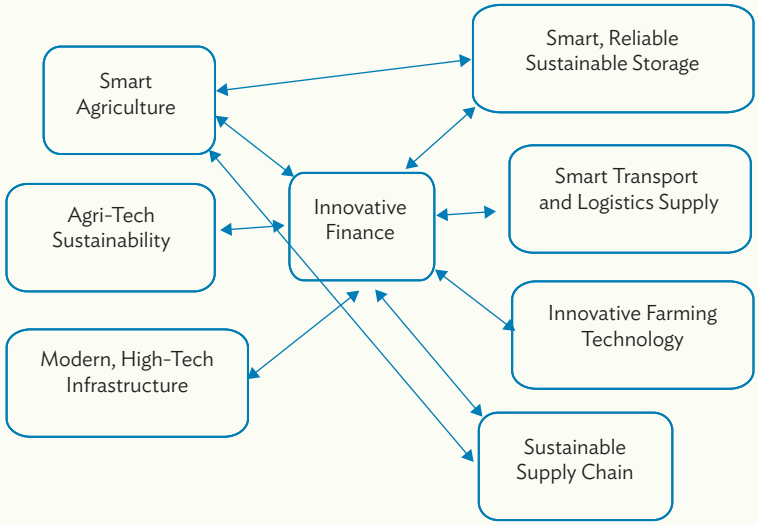
and the growth of sustainable value chains by promoting market infrastructure, information systems, and the implementation of quality standards. These initiatives promote equitable trade, environmental preservation, and social inclusion.

The cold chain system is predominantly relied upon in the food supply chain within the field of logistics (Oliva and Revetria 2008). The present system pertains to the preservation and conveyance of commodities at significantly reduced temperatures, a process that holds significant importance in nations located in Southeast Asia, primarily owing to their tropical weather conditions and the escalating requirement for short-lived items, propelled by population expansion and economic progress. The cold chains present in said countries are frequently deficient, costly, and heavily dependent on energy sources derived from fossil fuels and hydrofluorocarbons. The latter is a category of fluoride F-Gas that possesses a global warming potential 23,000 times greater than CO_2. The significance of inefficient cold chains on the environment should not be disregarded, as stated by Sharma-Khushal (2020). The factors mentioned above present obstacles in the pursuit of a sustainable food security system that integrates economical and ecologically sound technologies to alleviate the impacts of climate change. Therefore, the implementation of policies such as incentivizing investments in cold chain businesses, offering tax exemptions for investments, allowing foreign investors to participate, and executing government-led infrastructure initiatives have proven to be efficacious. Therefore, it can be argued that relying solely on these measures is inadequate for attaining a food security system that is sustainable (Kusano 2019; Munodei and Sibindi 2023).

8.3.1 SAM–SSIS Action Plan in the ASEAN Region

ASEAN countries seek global innovative finance as the highest priority because there is no other alternative as the capacity of ASEAN member countries is limited to bridge the investment gap and limited to their budgetary resources. Global innovative financial support to establish a sustainable FSS proposed as SAM–SSIS, which is the utmost priority in the ASEAN region.

Figure 8.1: Proposed SAM–SSIS Model for Sustainable ASEAN Food Security System



See footnote 1 for meaning of SAM–SSIS.

Source: Authors.

Smart Agriculture

Innovative finance through public-private partnership schemes can create a dynamic, effective, and sustainable smart agriculture farming system across the ASEAN region. This facilitates the infrastructure to leverage advanced innovative technologies such as the internet of things (IOT), big data, and the cloud which can track, monitor, and execute automated operations, increase agriculture efficiency, provide alarms against food loss, and positively reduce food loss. Advanced smart agriculture represents the agri-industrial revolutions that increase agricultural product quality and yields. The use of smart agriculture infrastructure is the only way to minimize the environmental impact of agri-production.

Agriculture Biotechnology

Advancement in agriculture biotechnology (agri-tech) allows the application of scientific tools and techniques with the use of genetic engineering, modification of living organisms, molecular markers, and diagnostics, which improves the health of plants and agri-products in terms of quality and quantity. Continuous dedicated scientific research and pieces of evidence resulted in to develop of sustainable agri-tech that results in crop improvements (Kavipriya et al. 2019) and it can be the best alternative to climate change, creating smart production that provides the highest yields (Kusumi, Murayama. and Yoshitake 2020). The ASEAN region together incorporates green innovative finance investing schemes that create long-term public-private fundings to establish such high-technology for effectual agriculture systems. The Agri-Food Process Cluster Transformation Fund, the Agriculture Innovation Fun, the Agriculture Research Development Fund, and several other schemes generate positive contributions and probably a revolution to the Asian region in food production. For instance, the People's Republic of China uses planting technologies, particularly modern irrigation, weed, and pest control, and chemical fertilizers that have increased crop yield per unit area and has become the world's largest food producer (Fan et al. 2012).

Modern High-tech Infrastructure

Modern high-tech agriculture infrastructure provides ASEAN with ultra-modern facilities that includes all necessary digital and physical infrastructure transformations. This sets up a competitive advantage in channelizing food production, management, control, storage, and a distribution roadmap. Such infrastructure facilitates and promotes an environment for agriculture innovation, regional and international collaboration, and technology foresight in the ASEAN region. The 2017 United Nations (UN) conference sets a strategic roadmap role of science and technology on innovations in food security plan to achieve by 2030 considers the importance of structural change in infrastructure that delivers higher productivity, and efficiency with increasing returns to scale (UNCTAD 2017). Modern agriculture infrastructure would restructure the food system capabilities and expand the possibility in local markets and international commodity trading.

Smart, Reliable, Sustainable Storage

An environment-friendly, high-quality food storage retains the food quality and nutrition content in different types of food products. This process incorporates soil diversity to production and storage, retention of nutrition contents, and stores until food channelizes into the distribution network. Smart, reliable food storage allows automated temperatures according to the number of days of storage, significantly reduces food loss and waste and has low environmental impacts. Further, sudden climate change impacts food nutrition quality—particularly heat stress, the level of carbon dioxide ($C0_2$), tropospheric ozone, and change in air quality, etc.—and can spoil food content. Damaged foods

reduce marketability, which not only impacts food costs but also imposes significant environmental costs incurred during farming, cropping, and initial labor efforts. These costs, which were originally intended to satisfy hunger, ultimately result in permanent food loss. There is no parallel alternative to smart, reliable, and sustainable food storage systems in ASEAN countries.

Smart Transport and Logistics Supply

Effective intra-logistics facilities, well-planned and dynamic distribution systems, and digital control over every aspect of operations, from pick-up processes to smart transit, which also includes essential temperature management and location tracking, enhance the overall efficiency of the entire network. Transit time is most important when food products are transported. Smart transportation logistics networks are a key contributor to the economy as well as reducing transport pollution. At least one-quarter of carbon emissions are contributed by transport only. A systematic strategic plan reduces the climate and environmental impact, minimizes transit costs, increases the efficiency time, and allows accessibility and availability of food in different locations.

Innovative Farming Technology

The 21st century has contributed innovations in every direction, including innovations in farming technology as food production creates major environmental impacts such as land degradation, desertification, exhaustion of natural resources, and contamination of air and water (Montanarella, Scholes, and Branich 2018; Whitmee et al. 2015; Ruben and Clerex 2003). Modern farming technology includes the use of automated farming tools such as automated irrigation systems, temperature sensors, humidity sensors, carbon emissions sensors, light-intensity sensors, nutrient and fertilizer sensors, water-level sensors, etc., which directly connect with the cloud and big-data networks, operated and monitored from distant locations. This optimizes the externalities and improves crop yield, quality, and quantity. Timely information to farmers can identify the need for customized fertilizers for different crops and locations. For instance, the Soil Resource Development Institute partnered with Katalyst to develop information and communication technology that provides recommendations to farmers on the use of different fertilizers in Bangladesh (UNCTAD 2012).

Sustainable Supply Chain Network

A cascade of sustainable practices is on a higher scale in developed as well as emerging countries, including ASEAN member countries. Globalization, growing technology, the flow of information and increasing research in multiple directions result in the acceleration of activities and happenings and increase the speed of world transformation in vulnerable environments. A supply chain network involves intricate mechanisms, especially when the aim is to achieve optimal environmental impact and sustainability. A sustainable supply chain network incorporates a strategic network that results in best practices in resource management, waste control, pollution control, smooth recycling, long-term viability, business and financial reliance, and focuses on a triangle development economy, the environment, and social development. It includes segregation of food products, location and inventory analysis, projection of distances, public–private supply network partnerships, projection of possible greenhouse gases, optimum energy use, and retention of food quality and nutrition during the entire supply chain network.

8.3.2 Role of Innovative Financing—Sustainable Food Security System

Private financing in the sustainable food security system is gaining traction in ASEAN. The private sector plays a dominant role in providing financial services and microfinance to small-scale farmers (Sylla 2023; Olaleye et al. 2023), as well as offering investment and equity opportunities in agriculture (Nkala 2023). Three significant financing approaches are debt, equity, and blended financing. Debt

financing involves domestic and international commercial banks investing in the region's sustainable food sector, with international banks aiming to provide low-interest loans to farmers. On the other hand, equity financing provides opportunities for investors to invest in the agriculture sector. Blended finance (Apampa et al. 2021; Bakare, Ogunleye, and Kehinde 2023), the third form of private financing aims to facilitate the transition to a sustainable food system. This approach involves commercial banks and other institutions that offer financial services but do not have a banking license, requiring a multi-stakeholder partnership between financial security and the food agriculture industry (Mapanje et al. 2023). Moreover, The UN Food System Summit's Action Track 3 emphasizes the need for financing models and instruments that grant food value chain actors, including farmers, access to capital and incentivize investment in more sustainable production practices (Diaz-Bonilla et al. 2022; Huang and Azman 2023). Blended finance presents a solution in this regard. Hence, private sector finance for sustainable agriculture in developing countries is primarily sourced from banks, microfinance institutions, retail investors, international banks, insurance and pension companies, and sovereign wealth funds.

Prior research indicated that farmers seek finance when they aim to adopt new technologies and innovate within the context of the food system transition, acquire land and resources to facilitate the preparation of the land for production, marketing of crops, plants, and livestock or often requiring long-term loans (World Bank 2020a; FAO 2018, 2015, 2017; Crippa et al. 2021; Diaz et al. 2019; Shakhovskoy, Colina, and Hook 2019). Likewise, it was noted by Paramati, Apergis, and Ummalla (2018), Antwi-Agyei et al. (2018), and Pan et al. (2021) that when farmers have access to simple loans from financial institutions like banks, they can use these funds to buy the most up-to-date equipment, tools, high-quality seeds, pesticides, fertilizers, and adopt contemporary methods of sowing, watering, cultivating, and harvesting crops, plants, or trees. Agriculture operations are made more agile and accurate by modern technology and procedures, which allows farmers to enhance production and preserve part of these products for future use. The consistent growth in agriculture aided by easy agricultural finance leads to sustainable food security (Nosrati, Malek, and Farajallah 2023). Hence, the capital market for rural agricultural finance has expanded beyond host country governments, agribusinesses, and donors to include a larger ecosystem of capital providers with varying objectives and investment philosophies but the role of financial innovations in private financing still needs to be addressed.

Innovative finance schemes and partnerships can establish positive leverage to existing FSS and reframe the sustainable FSS that remains resistant to feed hunger, reduce various stages of food waste, and set up high-quality storage networks and dynamic local supply networks. The food security system exhibits characteristics of an extensive network of economic, social, and environmental public–private integrated linkage chains. This includes modern agriculture innovations (agri-tech), irrigation systems, crop yield research, food safety measures, innovative cropping and re-farming, innovative land fertilizing, food safety system from heat and other climate changes, sustainable and quality storage, inter-linked supply chain networks, and dynamic distribution channels (Reardon et al. 2012, 2014). Thus, restructuring and reforming the existing food security system is imperative to achieve sustainable food security. Innovative finance schemes generate the best solutions and long-term investment into sustainability offers prospective growth opportunities for business financers, global mergers, and global tech-knowhow exchanges in the ASEAN member regions (Wang et al. 2023; Ruete 2015). The SAM–SSIS model proposed by the authors captures the dimension of environment, and economy and leads toward green and sustainable food security systems in ASEAN member regions.

8.3.3 SAM–SSIS Model to Implementation

ASEAN members have sufficient agricultural land area with great natural resources. The proposed model will emphasize food productivity, accessibility, and availability based on priority across the ASEAN member states. The SAM–SSIS model is intended to transform conventional agriculture into smart agriculture with agri-tech, modern, and effective farming through innovative farming technology

and use of high-tech infrastructure for storage, priority on transport to local areas including remote and vulnerable areas. This invites robust and sustainable supply chain networks, which would be public–private networks.

The model implementation process starts with screening the geographic conditions of the region, production capacity, and estimation of possible food growth changes considering sustainable storage and logistics facilities. One way is through the existing food security ranking along with comparing the previous 5 years growth changes. This will provide a better understanding about geographic prospects. Singapore is the best example, using ultra-modern and innovative food technology, and a sustainable and robust supply chain network. ASEAN members may introduce new tools and innovative finance, through green and/or innovative bonds, innovative contracts, innovative credit mechanisms, etc., which can bridge the investment gap. Moreover, innovative finance will strongly support the member states that face national budgetary challenges for developing a sustainable FSS. A central source of funds, for instance, the ASEAN Food Security Empowerment (FSE) would be another option that will empower member states based on the Global Food Security Index (GFSI). Further, the FSE nominates in-depth research to identify infrastructure such as paved roads, road density, and rail-line density, which would be part of the sustainable transport and logistics infrastructure. Similarly, nominated research would also find differences in domestic food prices and share of food expenditure of the poor and the population living in remote and vulnerable areas. These statistics could identify priority member countries along with priority regions or areas to start with. However, the GFSI could be one parameter to identify the priority region, however, it alone would not be sufficient to implement the FSE.

The Global Food Security Index can provide data to indicate the necessity to structure policies related to climate change and environmental and disaster management. These data would enhance the understanding about geographic possibilities and challenges. As per the FSI of 2022, the Lao PDR, Cambodia, and Myanmar would be given priority to implement the FSE. Whereas Thailand, Indonesia, and the Philippines are at the same level, therefore research becomes necessary to identify land fertility, the establishment of sustainable transport and supply chain networks, and high-quality storage facilities that ease accessibility and availability.

8.4 Conclusion

Innovative global finance can bridge the continuous lasting malnutrition gap in the ASEAN region and establish a high-quality, reliable sustainable food production and supply chain network. This study discusses malnutrition issues and the need for a self-reliable, high-quality, and sustainable food security system. Further, we propose the SAM–SSIS model that exhibits the specific segments that are considered to be focused, while formulating long-term strategies or relevant government policies.

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CHAPTER 9

Sustaining Food Security in ASEAN

Paul Teng

9.1 Introduction

Food is widely acknowledged as an existential need, without which human capital development would not be possible, and the inadequacy of which would affect economic growth and hamper efforts at inclusive or sustainable development. The financial crisis of 2007–2008 and the recent nexus of the novel coronavirus disease (COVID-19) pandemic, climate change, and the Russian Federation–Ukraine war have shown the vulnerability of Asia's food systems in an inter-connected world, with rising levels of food insecurity accompanied by increased hunger, starvation, and malnutrition. In current times, food security has become a "hot button" issue, causing concern to governments in Southeast Asia because of the potential to disrupt peace and slow economic development. Many governments have put in place initiatives to ensure there are adequate supplies of food and have also done strategic planning to assure food sustainability in the future under the myriad of challenges facing the world.

The chapter starts by explicating the scope of food security and contextualizing it against the backdrop of sustainability. Next, the current food security situation in the Association of Southeast Asian Nations (ASEAN) region is described, followed by discussion on the challenges to food security. The chapter will propose opportunities to achieve sustainable food security and make recommendations for action. The concluding section provides suggestions for action to move forward.

9.2 Scope of Food Security and Sustainability

Food security is an important contribution to sustainability, be it to food systems or to entire economies. It is therefore not surprising that the Sustainable Development Goals (SDGs) of the United Nations contain many individual goals that are linked to food security, notable of which are SDG 1 (No poverty), SDG 2 (No hunger), and SDG 3 (Good health). Food insecurity is caused by poverty, which reduces economic access to food and in extreme cases causes hunger and malnutrition to affect human health. Food insecurity threatens the sustainability of societies and is made worse by climate (SDG 13) on land (SDG 15) and in water (SDG 14). Food systems that are sustainable with respect to their capacity to produce food and to keep the food-producing environment in a regenerative state for future generations are essential for sustainable food security.

9.2.1 Scope of Food Security

The generally accepted definition of food security is that of the United Nations Food and Agriculture Organization—a condition when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 1996). Food security is the state when all four basic dimensions are met simultaneously: availability, physical access, economic access. and utilization. A fifth dimension, stability was proposed by the FAO to emphasize the importance of the stability of the four dimensions over time (FAO 2008). This stability dimension may be considered as representing the sustainability of food security.

Teng and Oliveros (2015) noted that while each dimension is necessary for overall food security, they have different importance under rural and urban settings and exert influences on economies depending

on income levels and net food trade balances. While the thrust of most efforts in the 20th century was on addressing individual food security dimensions, more integrated approaches have evolved in the current century aimed at addressing the multiple dimensions of food security. A food secure status is not achieved until all the dimensions are satisfied.

Each of the four dimensions is briefly described below relative to Figure 9.1.

Food availability. At the country level, the availability dimension comprises self- production (through crop agriculture, animal husbandry and aquaculture), imports (through trade), food reserves and stocks, overseas contract farming, and food aid (Teng and Escaler 2014). All ASEAN member states have some level of food self-production, but all are subject to the threats shown in Figure 9.1. Furthermore, in ASEAN countries, food production is mainly done by smallholder farmers, and all ASEAN member states import food to varying degrees.

Physical access to food. Physical access refers to the movement of food from "farm to consumer", and commonly comprises supply chains, logistics, and transport infrastructure. ASEAN countries vary in delivering physical access, with the archipelagic countries having relatively poor capacity (e.g., Indonesia, Philippines) compared to those with strong capacity (e.g., Thailand, Malaysia).

Economic access to food. Economic access is the ability to purchase food and is therefore influenced by food prices (affordability) and household income. Poor households spend a disproportionately higher percentage of their income on food when compared to high income households (Teng and Montesclaros 2023). The ASEAN member states have adopted different approaches to deal with economic access. The actions range from cash handouts, to subsidized food items (oftentimes in government-sponsored retail outlets), but generally provide some safety net for the poor.

Food utilization. Food utilization includes nutritional and food safety aspects. Southeast Asia is estimated to have 6.3% of its population in 2021 under-nourished (FAO et al. 2022). An aspect of utilization which is receiving increased concern is food safety as food is traded more and more across long distances. Food safety standards vary greatly in ASEAN countries and in some have caused food insecurity because of food contamination.

9.2.2 Scope of Sustainable Food Security

Sustainable food security depends on maintaining stability in all food security dimensions as captured in the 1996 FAO definition (FAO 1996). Central to this is the sustainability of agricultural and agri-food systems.

In this chapter "Sustainable food security" is considered as food security that meets all or most of the dimensions of availability, access, utilization, and stability, and uses current resources to achieve these in a manner that does not jeopardize the food security of future generations.

Fundamental to sustainable food security is sustainable agriculture. While there is not a generally accepted definition, sustainable agriculture may be considered as "*A sustainable agricultural system is one that can indefinitely meet the* requirements for food and fiber at socially acceptable, economical and environmental costs" (Crosson 1992).

A sustainable agricultural system therefore needs to be economically viable, environmentally nurturing, and socially equitable (Teng 2017a):

- Economic viability (enables farmer livelihood)—focus on policies and measures to benefits small holder farmers, MSMEs along entire supply chains, and MNCs
- Environmentally nurturing (conserves natural resource base, minimizes negative externalities like pesticides, etc.)—practices that leave the natural resources in even better condition for future generations, e.g., those that minimize negative externalities; regenerative agriculture, etc.
- Socially equitable (benefits small and large farms, benefits producers and consumers)—addresses gap between poor and rich and promotes a desirable Gini Coefficient, plus aspires that all citizens have equal benefits from the state; and public and private sectors work in synergies to provide benefits.

Sustainable agriculture also needs to be contextualized as an integral part of sustainable development, which aims at "meeting the needs of the present without compromising the ability of future generations to meet their own needs", as proposed by the seminal Brundtland Report (World Commission on Environment and Development 1987).

9.3 Current Situation of Food Security in the ASEAN Region

Food security in the ASEAN region depends primarily on the production capacity (agriculture and aquaculture), supported by trade from within and outside ASEAN (Dy 2009). In times of food insecurity, some member states depend on food reserves (stockpiles).

Food security in the ASEAN region comprises those member states that are strongly reliant on imports (such as Singapore and Brunei Darussalam) and those with high levels of self-production (such as Thailand and Indonesia). However, having a high level of agricultural self-production does not equate to being self-sufficient in all food items and all ASEAN countries import food to some extent. To ensure that the food availability dimension of food security is met, ASEAN member states have advocated policies to such as declaring self-sufficiency for rice (e.g., Indonesia and the Philippines) to self-reliance (i.e., having the ability to purchase food through imports, e.g., Singapore) (Teng and Morales 2013). Countries like Singapore articulate a strategy called "resilience", to ensure that any food item has several sources from which to import, so that should supply from one source-country be disrupted, there is potential replacement from others (Teng 2020).

However, food importation depends on having sufficient foreign reserves and trade capacity, and unfortunately depends on a country's economic status such as whether it is "low income", "middle income" or "high income". High-income economies have greater import capacity and are generally more food secure (Desker, Caballero-Anthony, and Teng 2013). In times of shortfalls in production, especially of staples like rice, countries draw on their food reserves or stocks and stockpiles. Rice is the food item most commonly stockpiled in ASEAN although the stockpiling capacity is variable (Teng and Darvin 2019). At the regional level, the ASEAN Plus Three Emergency Rice Reserve (APTERR), exemplifies regional cooperation to maintain a rice reserve stockpile for emergency use (Teng and Darvin 2019).

The stability of food security over time is not assured by any particular approach taken by governments. As shown in Figure 9.1, many factors such as the volatile prices of production inputs, availability of land, labor, and capital and natural disasters and hazards such as floods and droughts can individually or together make the ASEAN countries vulnerable to food insecurity. Food self-reliance is also vulnerable to the hazards faced by the various sources of food supply as well as market volatility, trade policies of partner countries, and conflicts (such as the Russian-Ukraine war) in exporting countries (Donnellon-May and Teng 2023).

While there are different attempts to assess the food security situation in ASEAN as a whole and in individual member states, only one is highlighted here. The Economist Intelligence Unit's (EIU) Global Food Security Index (GFSI), commissioned by the company Dupont, was launched in 2012 to provide a "robust and consistent analytical framework" to measure and compare food insecurity across 113 countries (EIU 2022). The index builds on ongoing initiatives, such as the FAO State of Food Insecurity (SOFI) and the Global Hunger Index of the International Food Policy Research Institute (IFPRI). Nineteen indicators are organized in the GFSI analytical framework among four rubrics—availability, affordability, quality and safety, sustainability and adaptation—are used in the GFSI algorithm to calculate scores.

Table 9.1 shows the GFSI scores for the ASEAN member states for 2022.

The GFSI 2022 shows that ASEAN member states are in the top half of the 113 countries scored worldwide. ASEAN performs poorly in the sustainability and adaptation rubric, which reflects the vulnerability of member states to natural and human disruptions to food availability and affordability, two important dimensions of food security. It is also known that the Southeast Asian region is among the most affected annually by unexpected severe weather events like typhoons (Teng, Caballero-Anthony, and Montesclaros 2021).

As noted earlier, economic access is influenced by household income and reflects the economic performance (and status) of a member state. The richer ASEAN economies like Singapore, Brunei Darussalam, and Malaysia have the most favorable food security situation while the poorer nations like Cambodia, Myanmar, and the Lao People's Democratic Republic (Lao PDR) remain the most food insecure (EIU 2022).

Like all indices, the GFSI is a composite score. The GFSI assessments are heuristic at best and should not be considered as prescriptive. For example, Singapore ranks high in the GFSI as it has the economic and logistical capability to assure availability, affordability, and food safety and/or quality for its citizens through the country's relatively high economic status. What the GFSI does not reveal is the vulnerability of Singapore should there be any supply disruptions as happened during the COVID-19 pandemic and the ongoing war in Ukraine. Singapore also scores low on sustainability as it has limited natural resources to produce food or to buffer against disruptions.

Table 9.1: EIU Global Food Security Index 2022, ASEAN

Rank	Country	Overall	Affordability	Availability	Quality and Safety	Sustainability and Adaptation
28	Singapore	73.1	93.2	77.8	69.7	44.2
41	Malaysia	69.9	87.0	59.5	74.7	53.7
46	Viet Nam	67.9	84.0	60.7	70.2	52.2
63	Indonesia	60.2	81.4	50.9	56.2	46.3
64	Thailand	60.1	83.7	52.9	45.3	51.6
67	Philippines	59.3	71.5	55.2	65.3	41.8
72	Myanmar	57.6	62.1	53.5	64.4	49.0
78	Cambodia	55.7	74.3	54.5	54.0	33.9
81	Lao PDR	53.1	59.7	51.8	51.7	47.0

EIU= Economist Intelligence Unit.

Source: EIU Global Food Security Index 2022. https://impact.economist.com/sustainability/project/food-security-index

The ASEAN member states are at different stages of economic development as well as different phases of structural transformation of agriculture (Teng and Montesclaros 2023). Economically, the World Bank has divided the ASEAN member states into a High-Income Group 1 including Singapore and Brunei Darussalam (with gross national income (GNI) per capita of $12,536 or more), Upper-Middle-Income Group 2 including Thailand, Indonesia, and Malaysia (GNI per capita between $4,046–$12,535); and Group 3 including Cambodia, the Lao PDR, Myanmar, Philippines, and Viet Nam (World Bank). This division is reflected in their position in the GFSI, generally.

> The ASEAN population has also been changing demographically, with a rising middle class among its approximately 650 million people. All ASEAN countries have also been experiencing rural to urban migration, since there are better employment opportunities and higher wage rates in cities (Teng and Adriano 2021). This migration has led to a decline in the rural population, and consequently, the percentage of agricultural labor out of total labor in all member states has declined. A rapidly growing population in need of more food and a decrease in people in rural areas and workers in the agricultural sector together threatens the overall food production and supply in the region (Teng, Caballero-Anthony, and Montesclaros 2021).

In ASEAN, the agricultural surplus countries (net trade in products) are Indonesia, Malaysia, Thailand, and Myanmar, while all others are net importers.

ASEAN is still an important contributor to the world's food security through the production and supply of important food items. Two countries (Thailand and Viet Nam), are responsible on average for over half of the world's exported rice. ASEAN countries are among the top three exporting countries of pineapple, banana, mango, sugar crops, coffee, cashew nuts, and cassava. The region's semi-permanent to permanent agricultural land use has made it the world's top producer and exporter of vegetable oil (palm oil, coconut). Furthermore, ASEAN is also a major producer and exporter of seafood and has been the world's largest exporter of crustaceans.

Most of the food production in ASEAN is done by smallholders, each farming small areas commonly of 2 hectares or less. The large-scale plantations, notably in permanent agriculture land use, produce palm oil and rubber and are considered "industrial crops" by some countries.

Agriculture to produce food and industrial products therefore remains an integral part of the ASEAN economy, and despite trends of increasing urbanization and decreasing contribution of agriculture to national gross domestic product (GDP), agriculture remains an important activity that confers livelihoods to significant parts of the rural populations in most ASEAN countries. ASEAN's overall productivity and production in food security items like rice, vegetable oil, and fish suggests that these need to be maintained to assure sustainable food security.

9.4 Challenges to Food Security

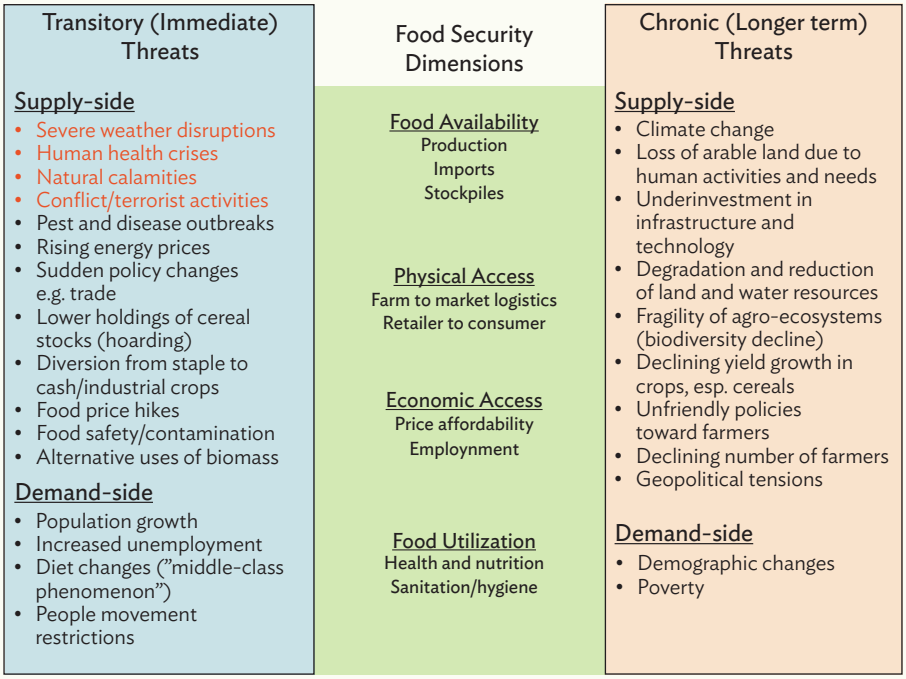
In general, the challenges to food security in ASEAN arise from multiple threats, both immediate and longer term, as shown in Figure 9.1, adapted from Teng and Oliveros (2015). The key challenges posed to food security by the threats in Figure 9.1 may be summarized as:

- Loss of arable land due to human activities and urbanization
- Degradation of the natural resource base
- Declining trends in agriculture production and crop productivity
- Influence of demographics on food demand, diet, and food consumption changes

- Declining and aging farming population
- Policies causing food supply disruptions and price hikes
- Underinvestment in agricultural infrastructure and research

These may be faced separately or concurrently and make food security a "complex" phenomenon.

Figure 9.1: Schematic Diagram Illustrating Immediate and Longer-term Threats that Challenge Food Security



Source: Adapted from Teng and Oliveros (2015).

Key challenges to food security are grouped by potential solutions (Teng, Caballero-Anthony, and Montesclaros 2021) for discussion, while other challenges will be discussed in the context of opportunities for solution in the next section.

9.4.1 Challenges from a Changing Physical Environment

The physical environment for food production is being challenged by climate and anthropogenic factors. Arable land area in ASEAN has declined due to demand from other uses such as housing and industry (Teng and Oliveros 2015). Land degradation and soil erosion are also rapidly taking place in the region. The average per capita arable land area in ASEAN meanwhile is only 0.12 hectares, calculated from data in the Asian Development Bank study (ADB 2022).

Climate change. Climate change as evidenced by higher and more variable temperatures, changes in precipitation patterns, and increased occurrences of extreme weather events are already exerting tremendous pressure on agriculture (Teng et al. 2015). Rising sea levels have also led to increased

salinization in river deltas and lakes, thus further reducing freshwater availability. Rice production in low-lying coastal and deltaic areas, which are some of the most productive rice areas, is therefore under serious threat (Teng et al. 2015).

Unsustainable natural resource depletion. Agriculture in ASEAN member states depends mainly on land, water, forestry, and biodiversity for its outputs. Demand for both food and nonfood and/or agri-based produce, such as feed, energy, and industrial raw materials, is rising significantly, and will continue into the future. The demand to grow more feed crops and for land-based food production exacerbate the challenges relating to the availability of land and water (Teng and Adriano 2021).

Land degradation. Land degradation, or the deterioration of the resource's condition resulting in the loss of its productive capacity, is one of the region's pressing environmental problems (Teng and Adriano 2021). Arable land in ASEAN countries ranges from a low of 0.8% (Singapore) to a high of 33% (Thailand) of total land area but is declining in all countries.

Exact and current estimates and measures on the magnitude and extent of land degradation are difficult to obtain but anecdotal evidence from ASEAN members point to a worrying trend. Shrestha (2011) has classified a large share of the total land area in Thailand, Viet Nam, and Cambodia as being severely degraded, while the rest of Southeast Asia's land area has been classified as experiencing moderate to severely degraded land degradation.

Water Insecurity. Global demand for water has been growing exponentially with the increase in water withdrawals averaging 1% per year since the 1990s (Teng and Adriano 2021). In Southeast Asia, the availability of water has been a growing concern, with competition for water among different sectors of the economy. Sustained high growth rates of ASEAN economies in the past 2 decades have resulted in an accelerated demand for water, partly from competing needs of the economic sectors (mainly from agriculture, industry, and energy), partly due to the rising population as well as an increasing rate of urbanization.

In their report, Teng and Adriano (2021) showed that Thailand and Indonesia, which are upper middle-income countries, are already experiencing medium-high levels of water stress, while the lower middle-income economies of Cambodia, the Lao PDR, and Myanmar are within the low baseline water stress. Fortunately, no ASEAN member state as yet falls into the most-stressed water levels.

9.4.2 Challenges to Increase Crop Productivity and Total Production

The average aggregate yield of many food security crops has shown steady decline over the years (Grassini, Eskridge, and Cassman 2013). Historical data from 1960–2010 also showed observable yield plateaus among large producers of cereals (Montesclaros and Teng 2021). The weakening of output (crop yield) growth can be traced to environmental factors, scarcity of resources, change in climate, and extreme weather conditions, all of which adversely affect crops.

The phenomenon of "yield decline "in crops like rice and wheat have been documented in long term experiments (Dawe et al. 2000) and also in terms of reduced growth in average yields in farmers' fields (Savary et al. 2022). While gross crop yields continue to grow in Asia, they have not grown as fast as they did in previous periods, i.e., there is a decline in yield growth. Montesclaros and Teng (2021) have postulated that the above may be due to a combination of negative externalities of agricultural practices (over-fertilization) and climate change effects increasing pest-induced losses.

Although the ASEAN member states have some productive food production systems such as those for oil palm, in many others, productivity growth has been declining. An illustrative example is that of

rice where on average, actual rice yields are often half of what the crop could potentially reach (Yuan et al. 2022). Such "yield gaps" exists not only in rice but in most crops and a key challenge in food security is how to reduce the gap between potential and actual yield on the one hand, and to reduce post-harvest losses and waste on the other hand. That yield growth is now less than the growth in demand remains an important issue for Asia to maintain its food security, especially for a staple like rice (Yuan et al. 2022).

9.4.3 Challenges from Changing Demographics and Evolving Consumer Demand

Changing demographics in ASEAN pose challenges (ADB 2012) because of a declining and aging farming population, and an increasing urban population accompanied by an increase in middle-class families. According to ADB, all ASEAN countries at least doubled their GDP during the 2000–2015 period (ADB 2022). As incomes rise, there has been a move away from a mainly cereal diet to a diet that includes more resource-intensive food products, such as meat, dairy, eggs, fruit, and vegetables.

The rural population engaged in the agriculture sector is on a downward trend in Southeast Asia, falling from 66% in 1980 to 50% in 2010 and forecast to abate further to 45% (Desker, Caballero-Anthony, and Teng 2013). As noted earlier, employment in agriculture has also declined in ASEAN as economies develop and generate more of their GDP from non-agricultural activities (Table 9.1). Since labor is an important input component of food production, the decrease in the farming population exacerbates the broadening gap in producing sufficient output to address the food demand. It is thus critical to promote strategies that make agriculture an attractive career for the younger population. It would also be necessary to see ASEAN countries adopt more labor-saving technologies such as mechanization.

9.4.4 Challenges in Technology and Innovation Access

In the 20th century, Teng (2021) noted that "green revolution" technologies such as synthetic fertilizers, improved seeds, mechanization, pesticides, water augmentation, and digitalized equipment impacted differently in the favorable farmlands like irrigated rice, in contrast to the more marginalized rainfed areas. The technology impact is largely attributed to the adoption of high-yielding crop varieties, and increased investment in irrigation and fertilizers. These improvements had important implications for economic and social development in the ASEAN member states that relied heavily on the agriculture sector, in particular to diminish poverty and stimulate economic growth.

This century is seeing a new set of technologies such as digital, biotechnologies, and nanotechnologies, which have the potential to significantly change the agricultural landscape (Teng 2021). While Southeast Asian countries with a more developed rural sector such as Malaysia and Thailand will have the capacity to use advanced technologies, some, like Myanmar, the Lao PDR, and Cambodia, still have room to increase their use of 21st century technologies.

The adoption of novel technologies to improve the rural economy is likely to vary according to the stage of development in the rural areas. Technologies on their own are not sufficient to effect change in rural communities and policies and institutions are important enablers as well (Teng and Montesclaros 2023).

Advances in urban farming and agro-technology have been used in small urban city-states and net food-importing countries like Singapore (Teng 2020). These have occurred in response to the major social and economic changes as well as to the prevalence of food supply chains for modern food retail systems such as supermarkets.

A major challenge facing ASEAN is therefore to ensure that there is equitable access to the disruptive technologies (Christensen, Raynor, and McDonald 2015) that will make food security sustainable.

9.4.5 Challenges Faced by Smallholders as a Special Stakeholder Group

There are still an estimated 100 million smallholder farmers in the ASEAN region each farming less than 2 hectares, who remain an important part of the food producing landscape (Eskesen 2016). While large-scale commercialized farming sustains demand for food through higher output and greater productivity, criticisms persist on their ability to alleviate poverty and on their threats to environmental sustainability (Teng and Adriano 2021).

Farm sizes have important implications for food production because relatively large, consolidated farms have the capacity to be more efficient and productive by optimizing mechanization and using modern technologies. These trends and patterns point to the unequivocal importance to identify smallholders as an important stakeholder group in agriculture in the ASEAN agri-food sector and to develop approaches that focus on them (Teng and Oliveros 2015).

The rapid transformation of supply chains has obvious implications for the millions of smallholders in the region who are themselves food insecure. While this transformation has led to higher quality, safer, and cheaper produce for urban consumers, market participation by smallholders is lower (Minten and Reardon 2008).

Among the major challenges faced by smallholders are access to market, lack of organization, informal landholding, and poor access to credit (Teng and Oliveros 2015). Smallholders are commonly unable to meet the quality, safety, uniformity, and standards demanded by the modern marketplace based on supply chains and institutionalized purchasers. Also, because of economies of scale in production and processing, smallholders are unable to compete with large scale production systems. ASEAN could consider a stronger push toward "inclusive agribusiness" approaches to sustain growth in the agriculture sector, so that smallholders can play a bigger role in food supply chains, especially in times of crisis (Teng and Oliveros 2015).

9.5 Potential Solutions to Ensure Sustainable Food Security

In this section, potential solutions to ensure sustainable food security by meeting the challenges previously identified are grouped and presented as nine sets of recommendations for policy change and action.

Potential Solution 1. Increase food production and availability

1. ASEAN should intensify its efforts to use "disruptive technologies" (digital, biotechnology, physical/nano, etc.) for increasing agricultural productivity and consequently make more food available in a sustainable manner.
2. ASEAN member states should be encouraged to accelerate the adoption of digital technologies to increase productivity and address multiple challenges—improve farmers' income, address climate change, reduce food loss and waste, and meet consumer needs.
3. ASEAN is urged to recognize the important need for an adequate supply of fertilizers by increasing production facilities within ASEAN.
4. ASEAN can move toward a coordinated effort to use a "systems approach" to identify and tackle the constraints associated with supplies of agricultural inputs (seeds, fertilizers, pesticides) and post-harvest losses; this would strengthen the productivity of food systems in the region.

5. ASEAN can increase food availability through novel approaches such as novel food (e.g., plant-based proteins, cultivated meat, etc.) and producing food using novel technologies (e.g., vertical plant factories, aeroponics, etc.) especially in previously under-used space (e.g., in cities).
6. ASEAN member states need to tap opportunities to convert waste into food or feed items (i.e., waste valorization) through national, regional, and international initiatives on food loss and waste (FAO 2011).

Potential Solution 2. Ensure trade remains open in food and agricultural inputs

1. ASEAN needs to ensure that there is regional and subregional cooperation and coordination in trade in the face of disruptors.
2. Local and regional food value chains should be strengthened, including agreements to sustain supply chains that have intra-ASEAN origins.
3. ASEAN needs to put in place mechanisms that facilitate market connectivity and distribution networks for agriculture and food products and agricultural inputs.
4. ASEAN must continue to implement the goals set forth in the ASEAN Economic Community to move towards an integrated market.

Potential Solution 3. Improve food system resilience

1. ASEAN member states are urged to establish new early warning systems using artificial intelligence that monitor food prices and market risks, food stocks, market information and consumer alerts and/or or improve on current information systems like the ASEAN Food Security Information System.
2. Increase the level of self-production nationally and regionally (conventional food, alternative food, future food) and concurrently reduce food waste.
3. Improve resilience against climate change and natural disasters through investment in climate-resilient agriculture, and agricultural insurance, among others.
4. Encourage ASEAN member states to build up food stocks and regionally to increase the number of regional stockpiles beyond the APTERR for rice.
5. Reduce ASEAN dependency on imports of key food and feed items by increasing pan-ASEAN collaboration on research and development in breeding (e.g., tropical wheat, soybean).
6. Initiate more action to safeguard supply chains and manage risks of disruption.

Potential Solution 4. Increase public and private investments in the agri-food sector

1. Enhance collaboration with the private sector and international organizations to mobilize financial resources for supporting agri-food public–private partnerships;
2. Engage non-agriculture sectors such as trade, economics, finance, and transport to formulate regional cooperation for sustainable food security; and
3. Put in place government enablers (policies, regulations, etc.) to encourage private equity investments to develop ag-tech, food tech, and fintech in support of all food security dimensions.

Potential Solution 5. Promote more regional approaches to solve common problems

1. Use existing or develop new ASEAN regional mechanisms for collaboration.
2. Encourage a regional approach in agri-food research and development, especially in the development and commercialization of specific agricultural and aquacultural technologies (e.g., digital and biotechnological).

3. Facilitate cross-member state knowledge and technology sharing to increase crop yields sustainably.
4. Improve trade facilitation through measures such as reduction of nontariff barriers for food within ASEAN.
5. Promulgate agreements to leverage comparative advantage of individual member states to increase production of high import-dependency crops in ASEAN.
6. Facilitate responsible co-investments in sustainable agri-food production systems, especially climate smart systems.
7. Strengthen information collection and sharing on food production and food stocks to avoid potential trade restrictions.
8. Formulate multi-member state agreements to maintain dynamic stockpiles "beyond rice" to support any regional emergencies.

Potential Solution 6. Accelerate smallholder integration into modern food systems

1. ASEAN needs to put in special programs to ensure development and access to new scale-neutral or size-specific technologies and knowledge that allow smallholder farmers to improve their productivity (Teng 2017b).
2. Encourage member states to increase their activities in technology transfer and extension to smallholder farmers, particularly those in marginal environments and those farming "orphan crops".
3. Encourage ways to increase access to finance for smallholder farmers.
4. Work with the private sector to develop ways to include smallholder farmers in modern food supply chains.

Potential Solution 7. Develop rapid crisis responses to ensure food and nutrition security

1. Establish an ASEAN mechanism for a comprehensive rapid response for food security and nutrition in times of crises;
2. Strengthen the effectiveness of existing ASEAN mechanisms such as the APTERR for rapid release and delivery of rice to countries experiencing food emergencies;
3. Assist member states to strengthen social protection measures and safety nets by sharing mutual experiences, and
4. Explore developing a pan-ASEAN rapid response coordinating unit to be located either at the ASEAN Secretariat or a member state.

Potential Solution 8. Encourage ASEAN member states to adopt a "preparedness" paradigm

1. Establish an ASEAN-wide concept and mechanism for preparedness to anticipate challenges to food security and nutrition.
2. Strengthen national policy frameworks for food security and nutrition, and intensify coordination across ASEAN member states to tackle this issue.
3. Encourage all dialogue, strategic, and development partners of ASEAN to identify meaningful projects and programs to promote resilience and sustainable agri-food systems, and food security and nutrition in the region.

Potential Solution 9. Intensify human capital development (education) for a new agriculture

1. Encourage institutes of learning and/or teaching to develop and offer curriculum on "agro-entrepreneurship" (Ahmed, Ra, and Teng 2019).
2. Link STEM education (Teo, Tan, and Teng 2021) as foundation to a science-based approach to food security in school and adult education.

9.6 Concluding Remarks

Caballero-Anthony, Teng, and Montesclaros (2020) proposed that in the immediate to short-term ASEAN's food security agenda should prioritize the following key aspects (i) ensuring sufficient access to food production inputs, (ii) supporting farmer decisions through subsidized financing and advisory services, (iii) expanding the capacity for food transport and storage, (iv) securing reliable sources and channels for food imports, and (v) preventing supply crises arising from export restrictions.

ASEAN member states should avoid panicking and restricting their exports, as happened during the 2007–2008 food price crisis mentioned earlier which led to over 63 million people falling into undernourishment. ASEAN is well-positioned in this regard, given the 2020 Joint Statement issued by ASEAN Ministers on Agriculture and Forestry, which aims to "minimize disruptions in regional food supply chains by working closely together to ensure that markets are kept open, and transportation of agricultural and food products are facilitated" (ASEAN 2020). These measures are crucial to avoid unsustainability in food security.

The Rome Declaration on World Food Security and the World Food Summit Plan of Action (FAO 1996) established the foundations for various approaches toward a common objective—ensuring food security, at the individual, household, national, regional, and global levels. Concerted action at all levels is required. Each nation must adopt a strategy that aligns with its available resources and capacities to achieve its individual goals, while also cooperating regionally and internationally to organize collective solutions to global issues of food security challenges. In a world of increasingly interconnected institutions, societies, and economies, coordinated efforts and shared responsibilities are essential (Teng and Lassa 2016). Within the ASEAN region, it is more important at this time than at any other, that synergies can be found to develop ways to transit to a more sustainable food security.

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CHAPTER 10

ASEAN 2045: A Scientific Strategy for a New Sustainable Economy

Lan-Phuong Phan

10.1 Introduction: Looking Toward 2045

As Indonesia chaired the Group of Twenty (G20) in 2022 and the Association of Southeast Asian Nations (ASEAN) Summit in 2023, the economic community of more than 650 million people has reaffirmed its "strong commitment to upholding regionalism and multilateralism" and its role "as the region's epicenter of growth and prosperity" (ASEAN Secretariat 2023a). At the same time, ASEAN leaders seek to look beyond 2025, toward an integrated "digital community" by 2045 (ASEAN Secretariat 2023b).

ASEAN's current Vision 2025 being largely the result of efforts and initiatives dating from the turn of the 2010's ahead of the creation of the Economic Community, it is indeed the right moment to rethink ASEAN's growth, development, and integration strategy. Although ASEAN was quick to introduce a comprehensive recovery strategy from the COVID-19 pandemic as early as in the second half of 2020, it is argued that it still needs to set the pace for an ambitious, long-term, education, and research strategy to sustain its regional and global role in a multipolar and uncertain future,

"If your plan is for one hundred years, educate children", said Confucius. To achieve new sustainable growth pathways, "build stronger higher education and scientific capabilities", we would add. Echoing the recent book of ADBI showcasing the multifunctionality of rice production systems in Asia (Reddy and Rahut 2023), the present chapter argues that ASEAN has the potential to implement a more ambitious and integrated scientific and research strategy that would strengthen the genuine socioeconomic assets of the economic community and create long-term value.

10.2 ASEAN, an Epicenter of Growth in Need of a New Scientific and Research Strategy

The COVID-19 pandemic has taken a substantial toll on learning and well-being worldwide, even in countries where school systems have historically been effective and where internet connectivity and infrastructure is widespread (G20 2022a). In that context, the ASEAN countries were among the first to promote a collective, integrated response through the ASEAN Comprehensive Recovery Framework in the second half of 2020 (ASEAN Secretariat 2020a). The document highlights the key role of "human capital development, including digital skills and literacy, 21st century skills in basic education, TVET and higher education, and reskilling and upskilling for employment, including digital skills and creating job opportunities."

ASEAN early-stage systemic policy response to the pandemic also included a broader perspective of transformations in labor markets, exemplified by the "ASEAN Declaration of Human Resources Development for a Changing World of Work" adopted in June 2020 (ASEAN Secretariat 2020b). Hence, the pandemic has added to pre-existing transformations when accelerating the digitalization of numerous working processes, only that this has happened in a time of a deep humanitarian crisis that has revealed entrenched dynamics of socioeconomic imbalances, including across the ASEAN.

In 2022, the G20 presidency of Indonesia confirmed and introduced several policy innovations to address the pandemic's long term negative impacts on human capital, by promoting synergies between the education, digital economy, and employment ministerial working groups. Acknowledging that educational realities have changed significantly, due to the pandemic, it called upon the concept of mutual assistance or *gotong royong*, an intrinsic feature of Indonesia's approach to development, as a driving force.

The Indonesian presidency also called on the G20 countries to RESET by resisting and rectifying the widening disparities in academic achievement, health, and well-being that were exposed and exacerbated by pandemic disruptions. RESET, or recover together, strengthen education, and transform for the future, is a call for the G20 countries to reach, retrain, and re-engage every learner in effective learning environments that build strong foundational skills, psychosocial well-being, and pathways to success in school, work, and the wider community.

One year later, however, as Indonesia is chairing the ASEAN Summit and convenes a related higher education conference in Bandung at the end of August 2023, a quick look into the program shows a much lesser ambition (ASEAN Secretariat 2023c). The headlines of the plenary sessions refer to more routine issues related to growth, including innovation, digitalization, with a twist on environmental sustainability. A critical question therefore arises, whether how much the ASEAN has learned from the pandemic to provide affordable and inclusive education systems and develop new advanced research capabilities. The paradigm linking education and in particular higher education systems, with the provision of human resources to substantiate regional economic growth may sound even more critical than before the pandemic, as the region is confronted with macroeconomic uncertainties and the transformation of value and supply chains.

A regional and global economic powerhouse and industrial hub, the ASEAN region cannot ignore questioning the very content and quality of growth and how education systems will effectively help tackle the deep skills, capacities and knowledge gaps that have been triggered and deepened by the pandemic. In addition to education and higher education systems, the pandemic has "exacerbated inequities in R&D funding" across the globe (UN 2023a). This raises the question of ASEAN's capabilities to set up and invest in its own advanced research agenda, be it about green growth and renewable technologies such as battery production and electric mobility, sustainable urbanization and infrastructure systems, interoperable digital trading systems, etc.

As the COVID-19 pandemic has left profound scars, developing Asia is even more exposed than countries that are strongly emerging on the global stage, as was illustrated by the successful presidency of the G20 of Indonesia in 2022. Such development differences are also true within ASEAN that would benefit from a harmonious development of social capital. The example of the role of research, higher education and science in the integration of European Union countries could serve as a benchmark for ASEAN countries, and such changes can only happen if they are sustained in the long run. In that regard, the Indian presidency of the G20 offers another interesting illustration, as the leaders' declaration from the Delhi Summit in September 2023 calls for a more balanced approach of urban and rural development, including through digital public infrastructure. There are untapped or sometimes even forgotten reservoirs of social cohesion across generations and sociocultural milieux in rural areas, which could be enhanced greatly by recognizing the multifunctionality of agriculture, starting with rice production. These could be among the main directions of an ASEAN long-term scientific strategy, that would also have global reach.

10.3 ASEAN and the Agenda 2030: Responding to a Global Need for Sustainability

(Re)building a strong ASEAN education, higher education and advanced research strategy considering sustainability issue including social sustainability, alongside environmental priorities, seems even more necessary if the ASEAN wants to play a bigger, pivotal, international role, whereas the 2030 Agenda shows many signs of premature fatigue.

We hereby echo the need to strengthen and review the architecture of the Sustainable Development Goals (SDGs) whereas the preparation work of the 2023 High-Level Political Forum on the SDGs and of the UN SDGs Summit showcases that "the SDGs are issuing an SOS (...) The cascading crises have pushed the SDGs out of reach. The Human Development Index has fallen globally for two years in a row, for the first time in over three decades" (UN 2023b). Alongside the national roadmaps and voluntary reviews of the SDGs, it is the right moment for ASEAN to bring up its own contribution to reposition the 2030 Agenda. The ASEAN+3 format could be the right fit to address financial perspectives, especially the role of multilateral development banks and harmonized ways to tackle debt relief for middle- and lower-income countries. Interoperable green taxonomy between ASEAN and EU might be another way to steer the greening of industrial systems and promote sustainable and responsible consumption and production well beyond their limits. ASEAN's leading role in the development of the Regional Cooperation Economic Partnership (RCEP) is another way to promote effective green growth in the aftermath of the COVID-19 pandemic.

As illustrated by the theme of the High-Level Political Forum 2023, "Accelerating the recovery from the coronavirus disease (COVID-19) and the full implementation of the 2030 Agenda for Sustainable Development at all levels", the notion of recovery from the pandemic remains high on global and regional agendas. This was also well featured by the motto of the G20 presidency of Indonesia in 2022, "Recovering Stronger, Recovering Together." One problem is that current geopolitical divides tend to narrow down the space allowed for "togetherness" in international relations, which in turns does impact regional and global growth perspectives. Another connected problem is that the very content of growth can no longer replicate the main paradigms of the past 2 of 3 decades, therefore questioning the capacity of leading global industrial regions such as Southeast Asia to stay on the forefront.

At the G20 Development Ministers Working Group meeting that took place in June 2023, the Prime Minister of India called for "comprehensive, fair and inclusive efforts to deal with the problems faced by the Global South" (Times of India 2023). He emphasized that development was a core issue in the aftermath of the COVID-19 pandemic. Hence, the ASEAN Secretariat could take advantage and seek inspiration from the High-Level Principles on Lifestyles for Sustainable Development (G20 2023a) and the G20 Action Plan on Accelerating Progress on SDGs (G20 2023b), adopted at the June 2023 G20 Development Working Group.

The G20 action plan indeed highlights the role of "global industrial, value and supply chains" and of "industrialization and modernization process" to foster "just transitions globally while leaving no one behind and encouraging sustainable consumption." Besides, it targets "collective, concrete and transformative actions on digital transformation; gender equality and empowerment of women" (...) "international and domestic support for decent work and job creation, quality education and universal social protection" (...) and "equitable quality education and lifelong learning" (G20 2023a, section 1). The issue of capacity building is underlined as of key importance (G20 2023a), while a whole section is devoted to gender equality and the empowerment of women.

Echoing the recommendations of the G20 India, the group of experts authoring the 2023 United Nations Global Sustainable Development Report argue that "using the rate of change on GDP to measure economic performance is an example of a product generated by a linear model of science policy interface which isolates economic activity from its interlinkages with nature, culture, gender, power relations and the social fabric" (UN 2023a). ASEAN countries need to invest even more substantially in long-term public, open research projects and programs, as "for achieving sustainable development in the 21st century, epistemic communities need to reflect the diversity of society and their interactions will need to be far more multi-directional and multi-disciplinary, so they can effectively address complex and interlinked challenges and goals" (UN 2023a).

10.4 Reviving the Spirit of the Krabi Initiative

Many of ASEAN's dialogue partners, such as Australia, the People's Republic of China, Japan, the Republic of Korea, the Russian Federation, the United Kingdom, the United States, and the European Union, are also G20 members. This makes the G20 a relevant platform to align ASEAN's bilateral engagements within a larger perspective. Additionally, India has invited Singapore, an ASEAN member state, as a guest country to the G20 Summit, while extending an invitation to the ASEAN Secretariat and its institutions even when the current ASEAN chair, Indonesia, is a G20 member (Shringla 2023). The convergence between the G20 under India's presidency, and ASEAN, only adds to the 0th anniversary of India–ASEAN relations in 2022. The commemorative summit pointed out to several key main directions, including "new and emerging technologies, in areas such as renewable energy, smart agriculture, smart cities, healthcare, and cooperation in the space sector", alongside "youth-centric activities to promote people to people connectivity and the ASEAN-India Science and Technology Development Fund" (AISTDF) (Shringla 2023).

The milestones of the G20 presidency of Indonesia and India in 2022 and 2023 should be the foundations for an active participation of ASEAN in the context of both G20 Brazil and South Africa presidencies in 2024 and 2025. The summit of the BRICS (Brazil, Russian Federation, India, People's Republic of China, and South Africa) countries in Johannesburg in August 2023 only confirms how much the world is at a redefining moment. Such redefinition includes sustainability principles aiming at Global South development and the redefinition of the 2030 Agenda. This will mobilize education and research institutions across the globe, highlighting the urgent need for ASEAN to redefine and adopt a seriously updated long-term development strategy for high education, science, and research.

The last ASEAN comprehensive study about science and technology was commissioned by the Advisory Body on ASEAN Plan of Action on Science and Technology in 2011, ahead of the 2015 vision and goals toward 2025 (ASEAN 2011). This process took place after the so-called "Krabi Initiative", a meeting of ASEAN members from the public, private, and academia gathered in Krabi, Thailand, for a special workshop in December 2010. The Krabi meeting was organized on the way to the Thailand Research Expo 2011, wherein 32 agencies in both government and the private sector shared their research knowledge under the prototype of the National Research Indexing Hub Project.

At the turn of the 2010s, key discussions focusing on the interoperability of research-based knowledge within the ASEAN, alongside the delineation of a long-term vision for the development of science and technology capacities, both human and in terms of infrastructure.[1]

[1] While the ASEAN Permanent Committee on Science and Technology (PCOST) was among the first 10 ASEAN permanent committees established in 1971, its priority was the production and distribution of low-cost protein-rich foods for infants and lactating mothers, an illustration of developing world issues, which look very different from contemporary agendas very much focusing on digital transformations.

At the ASEAN Summit of May 2023 in Labuan Bajo, the chair's statement introduced the concept of an "ASEAN Digital Community 2045", viewed as a way to "affirming the centrality of ASEAN and embracing digital innovation towards an inclusive digital transformation" in a global multipolar perspective and in the context of East Asian integration and of the RCEP (Ing and Vadila 2023). While this accounts for the rising digital financial integration across the ASEAN countries, it cannot replace a more thorough and comprehensive scientific strategy aiming at strengthening education and higher education capabilities in the long run and at anchoring research within the society. A quick overlook of current research and development priorities as per the ASEAN Dialogue with partner countries shows very different directions ranging from space exploration and the fourth industrial revolution to the inclusiveness of women in science, technology, and innovation or sustainable manufacturing, without any clear corresponding public policy process and articulated ways to interact at the junction of research, policy, and business.

In 2011, the study on the State of Science and Technology Development showed significant discrepancies among ASEAN member countries be it regarding the number of researchers per capita, or funding availability, with Singapore being the only ASEAN member able to match global standards. The lack of available harmonized statistics in today's context makes it difficult to make any comparison, which adds to the deficit of coordinated science and science to policy strategy by the ASEAN.

One response, though, was the launch of ASEAN NEXT in 2017, as an annual event jointly organized by ASEAN member states and dialogue partners on a specific theme of relevance to science, technology, and innovation and targeting policy makers, researchers, and private sector players. ASEAN NEXT works across the facilitation of knowledge sharing and the development of new businesses and is geared as much towards the development of new scientific capabilities than to encourage growth and competitiveness. As illustrated by the overarching theme of the meeting in Thailand in 2019 before the outbreak of the COVID-19 pandemic, "STI leading towards community happiness", the issue of science to society interface is part of the process (ASEAN 2019). However, the 2021 edition of ASEAN NEXT was a 1 day only, virtual event, and according to our research, the process has since then been discontinued. Other creative ways to delineate an ASEAN science and sustainability strategy could be explored, building on the richness and variety of development and growth connected initiatives such as the ASEAN Creative Economy Business Forum, which discusses value creation through creative economy and even explores the future of work (Buchoud et al. 2023).

The development of an independent or autonomous research and development policy within ASEAN has been focused on specific developing issues when it was initiated in the early 1970s, such as food security. Half a century afterward, it is time for ASEAN to leapfrog in the future, cognizant of the impact of the COVID-19 pandemic on global research and development capabilities. According to the Wuppertal Institute, by the end of 2021, G20 members of developed countries announced on average 4.5 times more spending on recovery in relation to their GDP than G20 members of developing countries, with a significant emphasis on green technologies and investments or climate adaptation, including corresponding capacity development (G20 2022b). This comes in addition to the notion of co-benefits, which has been explored in another study (G20 2022c) and which shows spectacular levels of interaction between climate finance and the SDGs" providing G20 policy makers with a greater understanding of how climate policy delivers wider co-benefits and thus contributes to sustainable development, sustainable recovery, and future economic and social resilience." (G20 2022c)

Viet Nam's late President Ho Chi Minh liked to quote an aphorism attributed to the Chinese philosopher Confucius "If your plan is for one year plant rice. If your plan is for ten years plant trees. If your plan is for one hundred years, educate children."

Till recently, this would have applied very well to Viet Nam, one of the few countries in the developing world with proven effective teaching (Nestour, Moscoviz, and Sandefur 2022). One reason accounting for the resilience and robustness of Viet Nam's public education sector is a long-run vision and support from the national government to the public education system itself, starting with the recognition and training of teachers across the country in urban and rural environments alike. However, the public education sector faces growing competition from high-paying jobs in the private sector, while new interdisciplinary skills are more and more in demand (Economist 2023; Parandekar et al. 2017). In addition, economic growth has pulled in migrants to cities, overburdening urban schools. In many regards, the case of Viet Nam could serve as a relevant benchmark to secure strong primary and secondary education systems in ASEAN, while reviewing the community's scientific and research strategy for the next 20 years.

10.5 Conclusion: Creative Ways Forward

While the COVID-19 pandemic has inflicted many scars, in the form of increasingly indebted countries and sometimes bankrupt firms and households, as well as lost human capital, it has also created opportunities, primarily arising from the rapid diffusion of digital technology, which could boost productivity, democratize education, and transform state institutions (World Bank 2021). Yet, it is not clear which reforms could help respond to substantial learning losses, especially among the poor, while ensuring the benefits of technology are shared widely across the people. Adverse effects of the pandemic on learning are expected to extract a significant toll on current students' future earning capacity across the ASEAN and furthermore, in East Asia (World Bank 2021). Before rushing to unilaterally "adapt" societies to digital transformations, policy makers need to undertake other reforms to strengthen teacher preparation, streamline curricula, improve teaching materials and textbook availability and last but not least, create new perspectives and interlinkages between primary and higher education, and research.

Not everything has changed with the COVID-19 pandemic. The World Bank, among other institutions, had alerted more than once on the looming global "learning crisis" way before the outbreak of the pandemic, affirming strong causal evidence of the intergenerational impact of educational interventions on children's developmental landmarks (Hasan, Nakajima, and Rangel 2020). With such lessons in mind, the ASEAN can affirm its global economic role in the coming years, provided it starts building a sustainable development and growth strategy backed by a renewed intra and extra ASEAN (ASEAN+3, ASEAN partners' dialogue, RCEP, etc.) capacity building and scientific plan. To achieve this goal in an innovative way, ASEAN should maximize its own societal and economic assets, especially at the convergence between scientific research, higher education, and creative economy.

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PART III

Deepening the G20 and ASEAN Indonesia's Multilateral Legacy

CHAPTER 11

Elevating ASEAN's Role in Regional Integration Amid Geopolitical Turbulence[1]

Yose Rizal Damuri and Dandy Rafitrandi

11.1 Introduction

One of the most important lessons from Indonesia's presidency of the Group of Twenty (G20) in 2022 was that economic cooperation cannot be separated from the political context. Even from the beginning of the presidency, Indonesia struggled with the twin challenges of ensuring the relevance of the G20's agenda, while accommodating the increasingly diverse interests of developing and developed countries. The eruption of the war in Ukraine in February 2022 and the escalation of geopolitical tensions worldwide added a layer of complexity to these tasks.

These developments highlight the inseparability of political contexts from economic cooperation and integration. While Indonesia attempted to keep the G20's attention fixed on economic issues, it became increasingly evident that geopolitical issues were too intertwined to be ignored. The 2022's G20's efforts culminated in a Leader's Declaration; however, ministerial-level meetings did not yield any joint statements. The Indian presidency in 2023 faced similar challenges: although the world needs cooperation more than ever; countries are more interested to be against each other and geopolitics has dominated the discussion in the G20.

In the midst of this, the rivalry between major powers, notably the People's Republic of China (PRC) and the United States (US), is intensifying. The PRC's rise as a formidable economic force and the country's growing influence has started a shift in the global geopolitical landscape. This escalation in major power competition poses significant obstacles to economic cooperation and raises the risk of a fragmented global economy divided into competing blocs. Such fragmentation could have detrimental effects, rendering economies less efficient, increasing costs, and exacerbating geopolitical discord.

The East Asia and Pacific (EAP) region,[2] which has reaped the rewards of peace and stability for over 4 decades, is particularly vulnerable to these developments. The region has witnessed remarkable economic growth, with numerous developing countries registering annual growth rates exceeding 7% for a long period. The region has also developed a complex network of production and supply chains that is dependent on regional stability. Increasing geopolitical tension could have multidimensional effects from trade disruptions, realignment of supply chains, maritime disputes, technological decoupling, and financial market volatility.

This chapter looks into the increasingly overlapping geopolitical and economic issues by analyzing how the rivalry between major powers threatens to destabilize economic integration and collaboration, in particular for the EAP region. It postulates that political and security decisions are now viewing

[1] The authors would like to acknowledge fruitful discussions with numerous researchers and experts attending the Jakarta Dialogue, a policy forum initiated by East Asia Bureau of Economic Research (EABER), the Australian National University (ANU), and the Centre for Strategic and International Studies (CSIS) Jakarta. The authors offer special appreciation to Peter Drysdale and Shiro Armstrong of ANU, who provided initial thoughts on the issues discussed in this chapter.

[2] The East Asia and Pacific region in this chapter refers to countries in Southeast Asia and Northeast Asia, together with Australia and New Zealand. When applicable it may also refer to other economies in the region, such as Hong Kong, China or Taipei,China.

economic interdependencies as potential vulnerabilities. This demands a reconsideration of the traditional approach of compartmentalizing economic integration and geopolitical matters, particularly in the EAP region.

In light of these developments, the chapter makes a case for a comprehensive security framework that encompasses all crucial aspects of security. It argues that the Association of Southeast Asian Nations (ASEAN) is ideally positioned to lead this initiative in the EAP region, owing to its institutional capabilities and acceptance among major powers. In addition, the chapter looks at how countries in the EAP region should bring the spirit of this framework to the G20 process.

11.2 Geopolitical Context: From Peace Dividends to Major Power Rivalries

The disintegration of the Soviet Union in 1992 marked the end of the Cold War and the rise of the United States as the singular global superpower. This shift toward a unipolar world appeared to promise a golden age of liberal democracy and free-market capitalism, often termed as the "End of History" (Fukuyama 1992). Although this global harmony did not fully materialize, East Asia, particularly the PRC, underwent dramatic development. The PRC elevated the standard of living for its population and emerged as a global powerhouse, altering the geopolitical landscape (Nishihara and Pajon 2020).

The PRC's rise coincides with a relative decline in US dominance, that became more apparent after the 2008 global financial crisis. The crisis accelerated the shift of economic power towards emerging economies, particularly the PRC. While the US and Europe were struggling with recession, the PRC's economy continued to grow, albeit at a slower pace. This was also followed by the rise of nationalism and populist politics in many parts of the world further complicated the US and its allies to maintain a united front on the global stage.

This period saw aggressive foreign policies, represented by the Trump administration (2017–2021), which engaged in a trade war with the PRC and withdrew from international agreements, e.g., the Trans-Pacific Partnership (TPP) and the Paris Climate Accord. Additionally, competition in technological advancements escalated, with countries striving to outpace each other and safeguard crucial technologies and raw materials. This marked a transition from unipolarity to multipolarity (Layne 2012) and resulted in heightened geopolitical tensions between major powers, impacting the East Asia and Pacific region, especially for ASEAN.

There are three reasons why the current rivalry could be a game-changer in ASEAN. First, the Southeast Asia region could become a playground where the major powers, especially the PRC and US, project their military influences. The United States has long maintained a considerable military presence in the region. Recently, the US expanded its military presence with a plan to open four naval bases in the Philippines (Lendon 2023), while also tightening defense ties with allies in the region, such as through AUKUS and Quad (Hass 2022). At the same time, the PRC has been rapidly modernizing and expanding its military capabilities, while intensifying its military presence in the region which has increased tension with several ASEAN member countries (Erickson and Martinson 2021).

Second, the major power rivalries are likely to be divisive for ASEAN. Some ASEAN countries are more closely aligned with the PRC due to their economic and political ties, while others have stronger relations with the United States. Indeed, at least four members have ongoing territorial clashes with the PRC in the region, which has been a source of tension within ASEAN, as they have not been able to agree on a unified stance over the territorial issue. These can lead to diverging views and disagreements within the ASEAN bloc when dealing with issues related to major powers.

Third, the rivalry between the US and the PRC extends beyond political contestation: it is also fierce competition in economic and technological capacities. As a group relying on economic interdependence to maintain its regional integration, the economic and technological race poses a significant threat to the region. Most ASEAN members are dependent on the US and the PRC as market destinations, sources of investment, and sources of low-cost supply chains. Smaller countries in Southeast Asia have found themselves in the position to choose their alliance with the major powers due to their economic dependence.

ASEAN, as an established regional grouping, has the capacity to mitigate tensions among major powers through dialogue and negotiations by leveraging its ASEAN centrality. ASEAN can foster regional norms and balance major power influences, while at the same time actively manage and safeguard regional stability and cooperation.

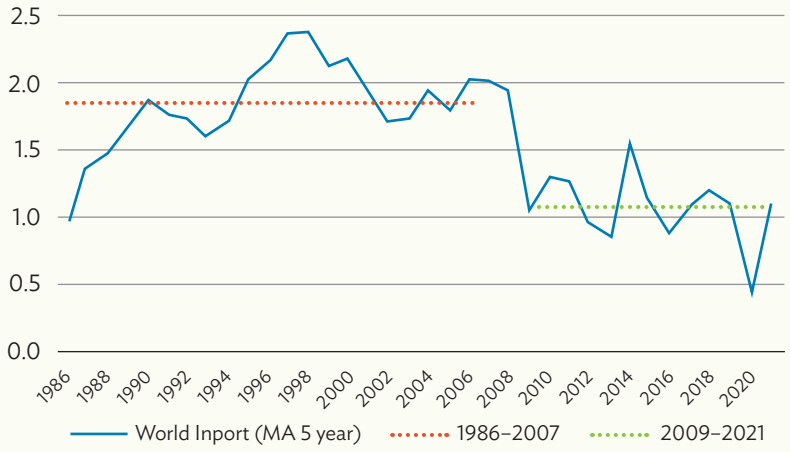
11.3 Economic Implications of Geopolitical Contestation

11.3.1 From Globalization to Fragmentation

The aftermath of the global financial crisis in 2008 marked a turning point of globalization toward growth slowdown and a rise in deglobalization. Recently, this shift has been accelerated by several factors, including the novel coronavirus disease (COVID-19) pandemic, rapid technological progress, as well as geopolitical tensions and major power rivalry, together with the changing policy toward protectionism and nationalism as described previously. This has raised concerns about the global economy being fragmented into rival economic blocs.

Four phenomena can be observed as results of the fragmentation of the world economy. The first one is the slowdown of trade relations. While the value of world trade is increasing over time, its portion of the world economy tends to decline after 2008. Figure 11.1 provides an indicator of world import growth relative to economic growth (in a 5-year moving average). It is obvious that world imports in the period after the global financial crisis tend to decline, while the more recent trade war between the US and the PRC in 2018, and the pandemic slow it down even further.

Figure 11.1: World Import Growth Relative to GDP Growth (%)



Source: Authors' calculation from World Bank WDI and UN-COMTRADE.

Several authors also observe this trend. Antràs (2020) analyzed the trends in globalization and deglobalization using international trade and investment data. He finds that globalization increased rapidly from 2000 to 2008 but has since slowed down. On the other hand, deglobalization, as measured by a decline in trade openness, started in 2012 and has continued to accelerate since then. The authors note that deglobalization has led to a decline in international trade and investment flows, a breakdown in global supply chains, and increased political tensions between countries. They also discuss the implications of deglobalization for global businesses, such as the need to diversify supply chains and adopt a more localized approach to production and consumption.

Second is the relocation of investment and production to secure the supply of intermediate inputs. Global interdependence of production that has taken place for the last 50 years, in the form of massive global value and supply chain, is no longer regarded to be the source of economic efficiency but rather to be the source of weaknesses and threats to security and strategic interests. In order to minimize the risks from excessive economic dependence, governments encourage firms to move their production back to their home countries, a practice known as reshoring, or relocate to countries more friendly to their interests, known as friendshoring.

Third is the rise of industrial policy. To persuade businesses to do reshoring, or to some extent friendshoring, many governments resort to industrial policy that aims to promote industrial development and improve economic competitiveness through a range of policy measures, such as targeted investment, subsidies, regulation, and trade policy. Baldwin and Evenett (2020) warned of the tendency towards protectionism during the COVID-19 pandemic. They find that many countries have implemented protectionist measures, such as export restrictions, import tariffs, and subsidies, in response to the pandemic.

Even in the US, which is historically skeptical to government interventions, there has been a growing recognition of the need for government intervention to address economic challenges such as inequality, job loss, and regional disparities. This has led to a renewed interest in industrial policy, with a focus on supporting the growth of advanced manufacturing, renewable energy, and digital technology. Examples of this include the Biden administration›s American Jobs Plan, which aims to invest in infrastructure and promote the growth of key industries, as well as the Chips and Science Act that is designed to promote domestic semiconductor manufacturing and to improve economic competitiveness.

Fourth is the weaponization of trade and economic policy. The competition among major economies is not only in promoting competitiveness but also in undermining others. This can take many forms, including tariffs, export controls, and sanctions. The ongoing trade dispute between the United States and the PRC is one example. The US has accused the PRC of unreasonable trade practices, including stealing the intellectual property rights and forcing technology transfer, and has responded with a range of trade measures, including tariffs on PRC goods and restrictions on PRC companies. The PRC has in turn responded with its tariffs on US goods and restrictions on US companies operating in the PRC. The practice is not only limited to the PRC and US but also to other countries, such as Australia and the PRC, or between the Republic of Korea and Japan.

The implications of fragmentation of the world economy are complex and far-reaching. The decline in international trade and investment flows has led to a breakdown in supply chains globally, making it more difficult for companies to access the raw materials and components they need to produce goods and services. Companies have responded by diversifying their supply chains, adopting a more localized approach to production and consumption, and exploring new markets and partnerships (Kim, Li, and Lee 2020). This has led to increased costs, reduced efficiency, and a decline in global competitiveness. Moreover, it can exacerbate geopolitical tensions even further and increase the risk of military conflict.

11.3.2 Implications to the East Asian Region

Most economies in ASEAN and East Asia are driven by a complex global production network and therefore putting these countries at a higher economic risk due to a fragmented global economy.

For example, the PRC (including Hong Kong, China) accounted for almost one-quarter of ASEAN countries' total trade in 2022. The International Monetary Fund (IMF) estimated that countries are disproportionately affected, depending on their trade intensity, with losses of about 3.3% of their gross domestic product (GDP) in the more severe decoupling scenario (IMF 2022). Another estimation suggests the global GDP shrunk by $52.8 trillion in the coming decade under a worst-case scenario of full decoupling. In addition, it also projects Viet Nam as the biggest loser as its GDP dropped by 8.2% below the baseline forecast for 2021–2030 (Burchell 2021). Interestingly, a study found that ASEAN countries will receive a positive impact ranging from 0.5–2.6% of their GDP from the global decoupling as a neutral party. On the other hand, the world's economy is projected to lose around 2.3–7.9% of total GDP (Kumagai 2023).

The impact of fragmentation on investment patterns in the region is still debatable. Would the US-PRC geopolitical tension lead to investment decoupling or would companies consider ASEAN countries in relocating their investment from the PRC? The total FDI into the Asia-Pacific region expanded by 64.3% t in 2021, nearly 7% higher than the before-pandemic level in 2019, accounting for 40% of global inward FDI in 2021. In addition, the FDI inflows in ASEAN recorded an increase of 42% in 2021 to $174 billion. the PRC remains the top destination for global FDI in Asia in 2021 and both ASEAN and the PRC have continued to deepen their economic cooperation through platforms such as the ASEAN–PRC FTA, the Regional Comprehensive Economic Partnership (RCEP), and the Belt and Road Initiative (BRI).

However, the trend might have shifted in 2022 as more companies seek to diversify from the PRC by reducing their exposure to policy risks and trade tensions. Table 11.1 provides a comparison of greenfield investment data in 2015 and 2022 and found that FDI already started to move away from the PRC and ASEAN countries. For example, from 2015 and 2022, US investment in the PRC decreased by 40.6%, and its investment in the rest of the world increased by 21.6% and in emerging Europe at around 19.4%. FDI from the PRC to other Asian countries has dropped by 44.3% and investment from Asian countries to the PRC is also significantly lower by almost 50%. In other words, the reallocation of FDI could be getting more sensitive to geopolitical tensions.

Table 11.1: Foreign Direct Investment Reallocation, 2020:Q2–2022:Q4 vs 2015:Q1–2020:Q1

Source regions	Rest of the world	26.4	7.1	5.3	11.4	–3.7	–24.7	18.6
	PRC	–22.1	–6.9	–17.8	–31.3	–44.3		–31.9
	Asia excl. PRC	–3.2	–8.7	–11.7	–2.4	–23.7	–49.2	–4.4
	Emerging Europe	27.6	2.9	9.9	18.1	–22.3	13.9	–11.5
	Developed Europe	7.5	–11.7	9.3	–0.9	–9.8	19.7	8.6
	Americas excl. US	18.6	27.3	14.9	34	5.9	–13.3	27.6
	United States		9.2	0.6	19.4	2.3	–40.6	21.6
		United States	Americas excl. US	Developed Europe	Emerging Europe	Asia excl. PRC	PRC	Rest of the world
		Destination regions						

PRC = People's Republic of China, Q = quarter, US = United States.

Source: IMF (2023b).

Technological decoupling worsens the global economy due to reduced knowledge diffusion and dampers innovation, which could lead to lower the world's productivity. Most importantly, it is harmful to the region's technology supply chain. For example, in 2020 when the US implemented export controls on Huawei, the company's imports from Japan declined especially for wireless communication equipment assemblies. Its estimated impact was around a 3.3% decrease in Japanese exports compared with the data in 2019 (Kimura 2023). In the future, ASEAN countries such as Singapore and Malaysia, will have a bigger impact due to their reliance higher reliance on PRC's companies' supply chains and therefore ensuring the supply chain resilience in the region will be the utmost priority.

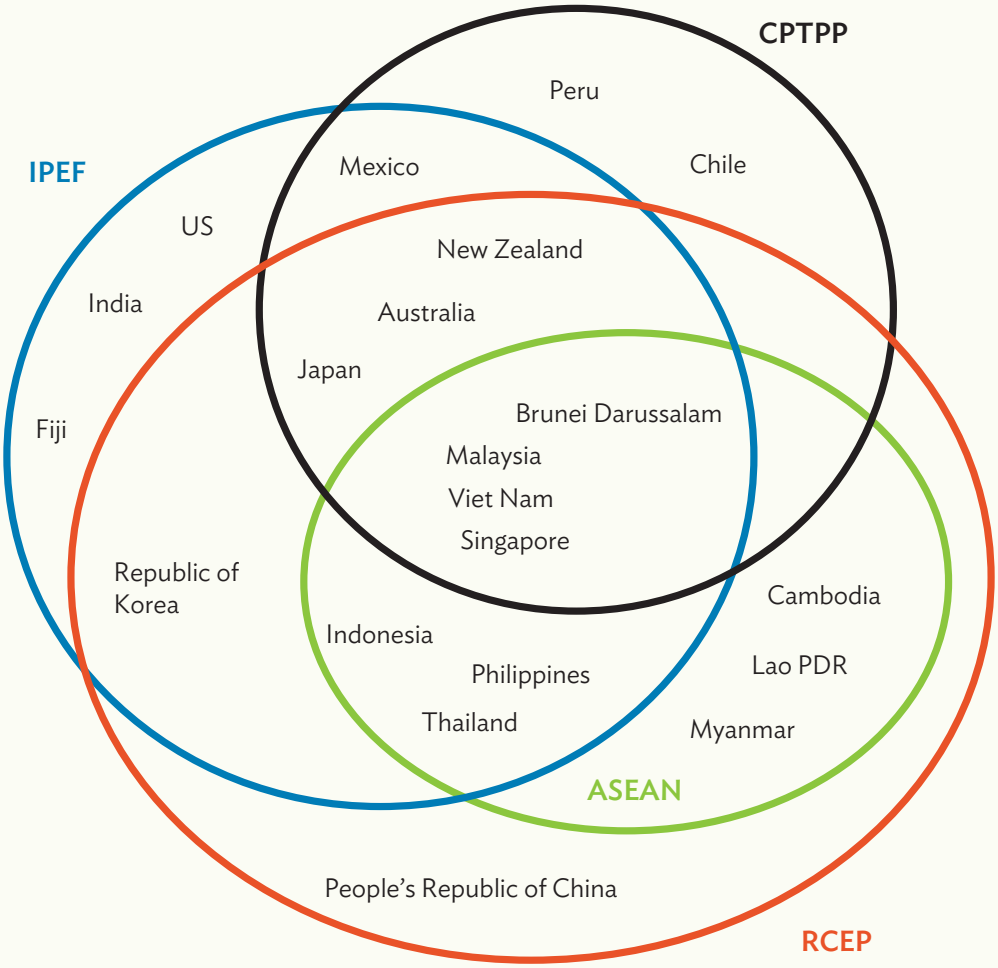
From the recent trends, the US has a strategic objective to secure its supply chain in the region, especially for semiconductors. The US initiated the Chip 4 Alliance with Taipei,China, the Republic of Korea, and Japan to reinforce its access to semiconductor chips. The US has also been active in using industrial policy tools such as Creating Helpful Incentives to Produce Semiconductors (CHIPS) and the Science Act that offers billions of dollars in incentives to manufacture semiconductors in the United States. Lastly, Apple's recent huge investment in India made it clear that the US companies are also taking the technological decoupling risk seriously (Phartiyal and Wu 2023).

Finally, the geopolitical dilemma of ASEAN countries in response to major power rivalries is a complex and challenging one. ASEAN has traditionally avoided both conflict or excessively close ties by hedging or double binding strategy. In other words, ASEAN cultivates ties with individual major players, so they develop vested interests in the region's stability, while enabling ASEAN centrality and neutrality among competing powers. This strategy has achieved success in bringing peace and prosperity to the region and won ASEAN a reputation as a bridge between great powers and an institutional buffer in geopolitical tension. However, with the return of great power rivalries, competing initiatives and economic cooperation platforms, ASEAN struggles to maintain its relevance and centrality in the regional architecture.

11.4 Geopolitical Dynamics and Competing Economic Integration in East Asia

East Asia and the Pacific has witnessed intensive formation of regional integration initiatives recently, and it may intensify the division in the region if not managed properly. ASEAN-led economic and regional architecture such as the ASEAN Outlook on the Indo-Pacific (AOIP) and the RCEP has different sets of economic and geopolitical consequences compared to other initiatives like the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the BRI, and the Indo-Pacific Economic Forum (IPEF), which are partner driven. Therefore, ASEAN needs to identify the key opportunities and challenges in navigating the geopolitical dynamic of each initiative in the region. Figure 11.2 shows ASEAN members' involvement in regional initiatives such as the RCEP, the CPTPP, and the IPEF.

Figure 11.2: ASEAN Members' Involvement in Regional Initiatives



ASEAN = Association of Southeast Asian Nations, CPTPP = Comprehensive and Progressive Agreement for Trans-Pacific Partnership, IPEF = Indo-Pacific Economic Forum, RCEP = Regional Comprehensive Economic Partnership, US = United States.

Source: Authors' illustration from various sources.

11.4.1 ASEAN-led Integration Initiatives

One of the major ASEAN-led initiatives is the RCEP, which represents a significant trading bloc, encompassing nearly 30% of the world's population, approximately 30% of the global GDP, and nearly 28% of global trade (ASEAN 2022).

The RCEP has the potential to contribute approximately $500 billion to global trade (Petri and Plummer 2020). For example, the RCEP is the only agreement that connects the PRC, Japan, and the Republic of Korea and these countries will experience the most significant economic benefits from the trade agreement. In addition, the RCEP could be a more effective communication platform in alleviating the trade tension to seek some common ground, for instance between the PRC and Australia. Lastly, the RCEP aims to be an open and inclusive group. Hong Kong, China and Macau, China have expressed their interest in joining the pact.

There are some debates regarding the RCEP and its impact on the global economy and geopolitically. Many commentators questioned the ASEAN centrality in the RCEP and whether the PRC influenced the agreement by making it less stringent in some contentious issues such as labor, the environment, and e-commerce. However, this is simply not the case because the RCEP's objective is to have a "living document" that can be upgraded over time. In shaping the rules and ensuring the agreement benefits all member nations, ASEAN also prioritizes strategic engagement with other like-minded countries, such as Japan and the Republic of Korea, to counterbalance the PRC's influence and protect the region's economic interests within the RCEP (Natalegawa 2020). To attest to this point, ASEAN needs to showcase its leadership by making some breakthrough to make the RCEP more relevant and Indonesia's chair this year offers a great opportunity.

In the recent decade, some countries have had an increasing interest in the so-called "Indo-Pacific" concept, which has various definitions and has produced white papers, outlooks, and even a partnership platform. The latest ones to join the trend are Canada and the Republic of Korea. Both countries issued their respective Indo-Pacific policy documents that cover thematic agenda, geographical understanding, and degree of inclusivity. This action prolongs the trend that was begun by Japan, the United States, the European Union, and France. The general objectives of using the Indo-Pacific term are to include the Indian Ocean and to put more comprehensive security issues on the table (Haruko 2020).

In response to these competing initiatives, in 2019 ASEAN introduced the AIOP, a comprehensive regional framework, to articulate its perspective on the geopolitics of the Indo-Pacific region. This strategic document, endorsed by ASEAN leaders, aims to enhance ASEAN's centrality in the region and advance the ongoing process of building the ASEAN Community. The AOIP seeks to bolster existing ASEAN-led mechanisms by providing impetus to effectively address emerging challenges and capitalize on opportunities arising from the evolving regional and global dynamics. Importantly, the AOIP emphasizes inclusivity and envisions cooperation across four key areas: maritime cooperation, connectivity, the 2030 Sustainable Development Goals, and broader economic cooperation, among others.

There are some debates regarding the effectiveness of the AOIP in managing ASEAN centrality in the region. Some countries already acknowledge and support the AOIP as a cooperation platform in their Indo-Pacific strategy such as Japan, the Republic of Korea, and Canada. However, there is also a lack of concrete actions and sustainable funds to operationalize the AOIP. Finally, key areas of cooperation in the AOIP should be updated to be able to respond to recent geo-economic fragmentation, for instance supply chain resiliency and energy transition issues in the region.

11.4.2 Other Regional Initiatives from Major Powers

In addition to the ASEAN-led initiatives, several other integration or cooperation initiatives are being developed in the EAP region. They are initiated or led by major powers.

The CPTPP is one of the most prominent initiatives in the region. It is often referred to as a high-quality regional trade agreement that holds significant potential for the global economy and geopolitical dynamics. The CPTPP is a revised version of the original Trans-Pacific Partnership (TPP) that was abandoned by the United States in 2017. With its ratification by 11 member countries, including some ASEAN countries such as Viet Nam, Singapore, Malaysia, and Brunei Darussalam, the CPTPP represents a major trade pact covering a diverse range of economies.

In terms of geopolitical dynamics, the CPTPP has both economic and strategic implications. Economically, the agreement reinforces the importance of regional economic integration and

cooperation, sending a message of openness and support for multilateral trade arrangements in an era of rising protectionism and unilateralism. The CPTPP also enhances the influence of its member countries in shaping the rules of global trade, particularly in the Asia and Pacific region. The agreement is often dubbed to be more advanced and forward-looking than the RCEP.

Geopolitically, the CPTPP has been viewed as a response to the PRC's growing economic dominance, including in the RCEP and the BRI. By strengthening ties among like-minded countries and promoting free trade principles, the CPTPP serves as a counterbalance to the PRC's influence and provides an alternative framework for economic cooperation in the region (Stewart 2018). The agreement can also catalyze broader regional integration efforts and deepen economic relations among member countries.

To date, several countries have applied to join the CPTPP, including the PRC and several ASEAN members (Heyden and Heine 2022). The PRC's potential accession is debatable since it requires unanimous consent among members to begin market access negotiations.

While the US initiated a trade agreement (TPP) to exert its influence in the region, the PRC focuses on development cooperation under the BRI, which seeks to deepen regional integration by connecting the PRC with Asia, Europe, and Africa through high-profile infrastructure projects.

The BRI is a game changer in foreign investment especially for infrastructure financing in narrowing the financing gap in developing countries. One estimate expects the BRI to involve $1 trillion in investments—mostly for infrastructure development projects such as ports, railways, airports, as well as power plants and telecommunications networks. ASEAN countries are benefiting from the BRI's various projects including the recently completed Lao PDR–PRC railway, and the Jakarta–Bandung high-speed railway in Indonesia, which also aims to be operationalized this year.

However, some controversies arise mostly due to the lack of transparency and accountability in the BRI financing process. Many BRI projects are negotiated bilaterally between the PRC and the host country, without involving other creditors or stakeholders. The terms and conditions of the loans are often not disclosed to the public or international institutions. This makes it hard to assess the debt sustainability and the economic viability of the projects. One example is the controversial major corruption case involving high-level senior officials in Malaysia.

Despite its controversy, financing initiatives from the PRC are still welcome in ASEAN due to large financing needs. Other initiatives that are closely related to the BRI such as the Digital Silk Road is also making the PRC's investment more relevant toward ASEAN members' ambition to harness their digital economy and technology. Finally, the PRC recently complemented its BRI with the Global Development Initiatives (GDI) and put sustainable development at the center to achieve common prosperity. As the GDI just released a couple of years ago, the concrete result remains to be seen.

After several years of absence, the US made a comeback in the EAP region by launching the Indo-Pacific Economic Forum (IPEF) to create a new economic area in the region, based on four policy pillars: trade, supply chains, clean energy and infrastructure, and tax and anti-corruption. The IPEF's 12 initial partners include six ASEAN countries, but does not include PRC. Although it consists of various crucial issues, it does not cover "traditional" market access yet.

By participating in the IPEF, member countries broaden their trade and investment networks by setting the same standards. The IPEF also supplements the existing regional economic frameworks in the region, such as the RCEP and the CPTPP. However, the IPEF could also generate tensions or divisions within ASEAN or between ASEAN and other regional partners in addition to worsening US–PRC

competition. Some ASEAN countries might also encounter pressure or coercion from either the US or the PRC to align with their interests or values. Additionally, the IPEF could entail high costs or burdens for ASEAN countries to meet the standards or commitments required by the initiative. Without a clear "carrot" such as market access or trade liberalization, ASEAN countries might experience trade-offs or trade diversion effects from participating in multiple economic cooperation frameworks with different standards.

Finally, the sustainability of the IPEF remains uncertain. Its executive-focused nature, without involving US Congress, raises questions about its continuity. The Trump administration's decision to withdraw from the TPP in 2017 serves as a valuable lesson not to invest excessive commitment and energy in an initiative when its continuity is in doubt. In other words, the US domestic political support for IPEF will be the main driver in shaping the level of commitment.

11.5 Need for A Comprehensive Security Framework Under ASEAN[3]

Economic interdependence has always been an important element in ensuring stability, peace, and prosperity in the East Asia and the Pacific region. The security foundation of the region is strengthened by rules-based multilateralism, with ASEAN at its center, facilitating a platform for robust security and political dialogue across the region. Furthermore, open and rules-based markets, again with ASEAN playing a pivotal role, mitigate the potency of trade and investment as geopolitical tools against each other.

This venerable structure, however, is now facing a very significant challenge spawned by the escalating rivalry of major powers as described in the previous sections. Yet, ASEAN remains the center of regional collaboration, instilling the process with its principles of inclusivity and consensus building. The group is the only organization with the capacity to actively shape outcomes in the region and beyond, although ASEAN is often constrained by internal disagreement and a lack of resources. Securing the multilateral order that the region needs means building upon and within existing ASEAN-centered institutions.

An essential step in this direction is to explicitly recognize the intertwining of economic and security domains, particularly given their converging trajectories in the current uncertain global landscape. Southeast Asian countries have long acknowledged the multifaceted nature of security, understanding that it extends beyond the military aspect. Economic integration has thus been instrumental for ASEAN members in reinforcing security and fostering regional cooperation. Furthermore, ASEAN has initiated various programs addressing nontraditional security issues, such as transnational crimes, terrorism, and cybersecurity, as well as human security, culminating in the establishment of the ASEAN Political–Security Community (Caballero-Anthony 2011).

However, despite a widespread tradition of thinking of national security in terms that go beyond traditional military threats, ASEAN has not paid sufficient attention to the overlapping of economic and security issues, leading to a fragmented approach to tackling regional challenges. The inability to formally bring forward economic integration as an integral part of regional security has prevented the association to deal with some major security issues in the region.

[3] This section and the next are drawn from the discussion in the Jakarta Dialogue, a policy forum initiated by the East Asia Bureau of Economic Research (EABER), the Australian National University, and the Centre for Strategic and International Studies (CSIS) Jakarta. Two closed roundtable discussions have been conducted to formulate policy recommendations to governments of ASEAN members and other countries in the region. The background paper for these roundtables prepared by Nicola Cole and Liam Gammon of EABER–ANU provides a basis for the discussion in this chapter.

One of the reasons behind the insufficient attention is the compartmentalized nature of ASEAN's institutional framework. The ASEAN Community is divided into three pillars: ASEAN Political–Security Community (APSC), ASEAN Economic Community (AEC), and ASEAN Socio–Cultural Community (ASCC). This structure, while intended to be comprehensive, has led to siloed decision making where economic issues are often not considered in conjunction with security implications and vice versa (Severino 2006).

Moreover, the principle of noninterference, which has been a foundation of ASEAN's approach to regional cooperation, also limits the integration of economic and security aspects. By observing the noninterference principles strictly, ASEAN states often avoid addressing internal issues of member states that have regional economic and security implications (Acharya 2009). For instance, political instability or human rights issues within a member state can have cross-border implications affecting both security and the economy, but the principle precludes ASEAN to take comprehensive responses.

The current increasing geopolitical tension and severe competition between major powers add a layer of complexity to the overlapping economic and security challenges faced by ASEAN. The PRC's economic influence in the region has been expanding through the BRI and other investments. While the presence of PRC capital in infrastructure projects can boost economic growth in ASEAN countries, it also raises concerns about economic dependency and debt sustainability.

At the same time, while the US maintained its military presence in the region, the economic component of the US engagement has been seen as lacking compared to the PRC's economic initiatives, particularly after its withdrawal from the TPP. While the US has tried to make a comeback recently, with its various Indo-Pacific initiatives, it only makes the situation complicated due to the exclusion of the PRC and several other countries.

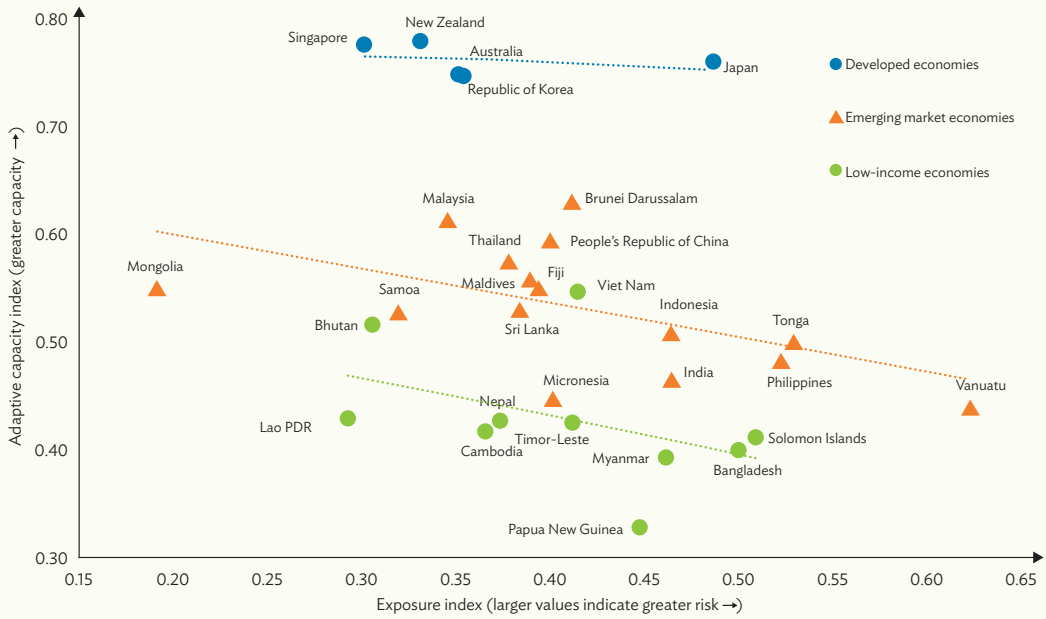
ASEAN member states find themselves in a precarious position, navigating the competing interests of these major powers. The major power rivalry can potentially create divisions within ASEAN, as member countries may align differently based on their economic interests and security considerations. This situation can undermine ASEAN's centrality and its unity. In this context, it becomes even more important for ASEAN to have an integrated approach to economic and security issues.

This comprehensive approach is even more important to address the existential challenge of climate change. The East Asia and Pacific region is vulnerable to climate change risks because of its dependence on the natural resources and agriculture sectors, densely populated coastal areas, and weak institutions (Anbumozhi et al. 2012). Moreover, climate change affects countries in East Asia and the Pacific disproportionately due to various factors from geography to institutions. Figure 11.3 shows how emerging and lower-income countries in the region are more exposed to climate risks and have less capacity for climate adaptation. Asia and the Pacific needs $1.5 trillion from 2016 to achieve the SDGs by 2030, or equal to 4% of the region's GDP (UNESCAP 2019).

The current geopolitical issue has the potential to undermine collaborative efforts toward combating climate change. Geopolitical rivalries can hinder the formation of consensus within multilateral forums. Major powers may use climate finance and technology transfer as tools of influence, offering support to countries based on geopolitical considerations rather than need. More importantly, it creates more incentive to diversify the limited resources by prioritizing military spending and strategic positioning over environmental concerns.

In light of these challenges, it is imperative for ASEAN to adopt a comprehensive security framework that integrates economic, military, and existential elements as integral components of national and

Figure 11.3: Exposure to Climate Risk and Capacity of East Asia and Pacific Countries



Source: IMF (2023a).

regional security. Such a framework should expand upon the concept of nontraditional security, emphasizing the indispensability of cooperation and interdependence. Rather than separating military and non-military security into disparate domains, this integrated approach must recognize economic, existential, and humanitarian considerations as equal elements of regional security frameworks. Elevating nontraditional security elements does not imply a downgrading of military security, but rather an assurance that broader considerations are not overshadowed by a narrow focus on military objectives. This framework should become the basis of ASEAN's engagement with its partners in the region, including the United States and the PRC. This will strengthen ASEAN unity and cohesion, as well as reinforce the centrality of this group among major powers.

11.6 Stronger ASEAN Centrality for Comprehensive Security Framework

During its 50 years of existence, ASEAN has developed institutional frameworks that have the potential to deal with economic and geopolitical problems comprehensively. However, the existing architecture was not designed to address the challenges on the scale currently confronting the region, particularly on the geopolitical and security front. ASEAN needs more ambitious commitments, which emphasize leadership and ownership from within the region, and to engage its partners to uphold a comprehensive approach to security based on multilateral principles and open regionalism.

This comprehensive framework should cover three important elements: peace, prosperity, and resilience. Peacemaking should be an integrative element of this framework. On prosperity, the framework would commit to utilizing the economic growth of the region to enhance the economic development and living standards of all countries in the region, including through expanded trade

and interdependence. The framework would address the challenges to resilience in the Indo-Pacific arising from the potential of open conflict and the emergent existential threats posed by climate change, pandemics, and resource depletion. No one element should automatically dominate the other nor being considered substitutes.

11.6.1 Comprehensive Security and ASEAN Mechanisms

Those three key elements of comprehensive regional security are already reflected within ASEAN's existing mechanisms for inter- and intra-ASEAN cooperation, including the ASEAN Economic Community, the ASEAN Political–Security Community, and the ASEAN Socio–Cultural Community. Embodying these principles within a framework of comprehensive security needs to take commitments already stipulated in existing agreements, including ASEAN's Treaty of Amity and Cooperation in Southeast Asia (TAC), the ASEAN Charter, and the AOIP, combined with multilateral commitments such as the World Trade Organization's Marrakesh Agreement, the Sustainable Development Goals, and Convention on the Law of the Sea. Adapting and combining these to form a set of principles would allow the mutual attainment of comprehensive regional security.

An important basis to advance a comprehensive security approach is to extend the TAC in Southeast Asia, signed at the first ASEAN Summit on 24 February 1976. It has two main objectives: to promote perpetual peace among the countries in Southeast Asia and to promote cooperation in various fields such as economic, social, cultural, technical, educational, and other areas of mutual interest. It has been open for accession to non-Southeast Asian countries as well, with many countries outside the region becoming signatories, indicating their respect for the principles in the treaty and their support for the objectives of ASEAN.

While instrumental, the TAC needs to be updated in order to accommodate the present-day situation. First, it is an agreement among ASEAN members and non-ASEAN signatories, using a "hub and spokes" logic with regard to its core ASEAN membership. In order to promote a comprehensive security framework, the TAC should be built as a genuine multilateral mode of operation among its member states. Second, while the TAC is legally binding, it is rarely enforced and only serves as a symbolic commitment to the region rather than an operational policy instrument (Yamakage 2017). Despite the provision of a ministerial council for conflict resolution between members, disputes among ASEAN member countries and also with their partners have been channeled either through the International Court of Justice or the World Trade Organization. Third, the treaty only covers traditional elements of inter-state behavior. Thus, the new challenges, such as the complex relation of a far more economically advanced and integrated political economy in the region, new rapid technological development, the existential threat of climate change, and the weaponization of economic policy and power, are not adequately addressed.

A new treaty or agreement should be developed in the spirit of the TAC. It would apply the successful elements of the TAC to a broader range of emerging military and nonmilitary security priorities including economy, digital, environmental, energy, maritime, social, and human rights security. Such agreements also need to be complemented with workable operational policy instruments to support their implementation.

11.6.2 Utilizing ASEAN-led Platforms

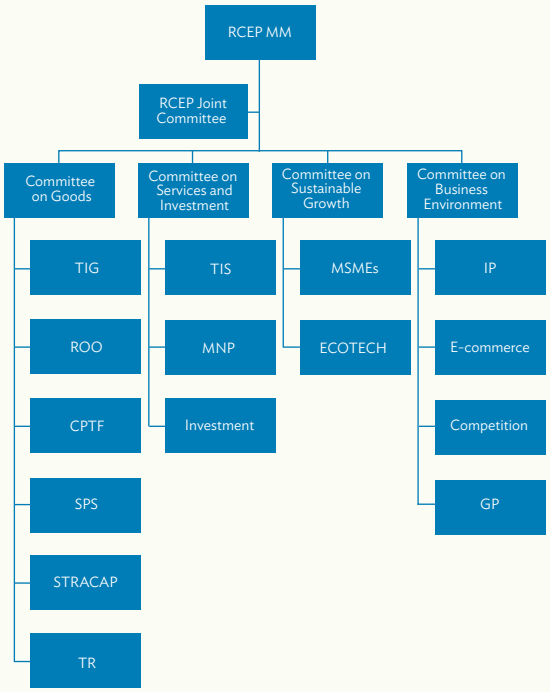
Two existing platforms under the leadership of ASEAN have the potential to promote a comprehensive security framework in the region. The first one is the RCEP. The agreement can serve as insulation from today's geopolitical rivalry especially given that the PRC is a participant in the agreement.

The RCEP economic settlement is an important opportunity to bridge the gap between major powers in the region and build political confidence and trust.

Three factors allow the RCEP to be an appropriate platform for advancing comprehensive security frameworks among countries in the EAP. First, the RCEP is based on several key elements for economic integration such as rules-based trade and investment, market access as well as economic cooperation (Kimura et al. 2022). Its binding economic rules and liberalization spirits demand favorable political support among member countries. The member countries need to ensure that political cohesion will be upheld to realize the benefits from the agreement. On the other hand, those key elements will provide a basis for greater geopolitical understanding in the region.

Second, unlike various other trade agreements in the region, the RCEP is designed with institutional support to carry out and monitor the implementation of general provisions of the agreement. There is provision for a joint committee of senior officials, regular ministerial meetings and also meetings at the leader level (Figure 11.4). Furthermore, a secretariat will be established for managing the integration and provide technical support, as well as recommendations for future progress. This institutional structure allows RCEP member countries to mutually set the direction of the agreement on a regular basis, and to come up with necessary remedies when the course of integration is no longer as expected.

Figure 11.4: Structure of the RCEP



RCEP MM = Regional Comprehensive Economic Partnership Ministerial Meeting, TIG = Trade in Goods, ROO = Rules of Origin, CPTF = Customs Procedures and Trade Facilitation, SPS = Sanitary and Phytosanitary Measures, STRACAP = Standards, Technical Regulations and Conformity Assessment Procedures, TR = Trade Remedies, TIS = Trade in Services, MNP = Movement of Natural Persons, MSMEs = micro and small and medium-sized Enterprises, IP = Intellectual Property, GP = government procurement.

Source: Rillo, Robeniol, and Buban (2022).

Third, one of the pillars of the RCEP is an economic cooperation agenda that has a long history in ASEAN to bring along its least developed members. It has the potential to go beyond capacity building and technical cooperation. The RCEP could provide a framework that facilitates deeper economic cooperation involving lesson learned or experience sharing and allow political cooperation. Using it productively, the economic cooperation agenda will offer the consensus-building platform and support for a comprehensive security approach.

Another potential ASEAN-led platform is the East Asia Summit (EAS). The EAS is a vital platform that brings together leaders from East Asian and Pacific countries, including major powers like the US and the PRC. The EAS can play an essential role in norm-setting and institution-building that centered around the peaceful resolution of disputes, respect for sovereignty, and commitment to regional stability. The forum can explore and promote economic interdependence as a means of ensuring stability. Together with the RCEP process, the EAS can advocate collaborative efforts that include the development of regional economic initiatives, trade agreements, and investment projects.

The proposed comprehensive security framework could also become one of the deliverables at the EAS Summit this year under Indonesia's chair. It provides an opportunity for ASEAN leaders and dialogue partners, including major powers, to endorse the principles of this comprehensive approach. By strengthening ASEAN centrality, a comprehensive security framework can enhance regional stability, cooperation, and resilience in the face of evolving geopolitical dynamics.

11.6.3 Beyond East Asia: The Comprehensive Security Framework in the G20

The process of promoting comprehensive security framework in ASEAN and the EAP region should also be recognized in the G20 process. As the world struggles with increasing geopolitical dynamics, the G20's central role in governing the global economic landscape and cooperation is an ideal position to play a pivotal role in shaping a comprehensive approach to security.

The G20 must consider the interplay between economic dependencies and security more seriously. Trade relationships, foreign investments, and supply chains can all have security implications, as we witnessed during the COVID-19 pandemic and after the Russian Federation's invasion of Ukraine. The G20 should promote diversification of trade and investment to mitigate such dependencies, thereby enhancing economic resilience and security. Integrating climate action into a broader security framework can ensure that the engagement for a sustainable environment is not sidelined by other economic and security considerations. Furthermore, in an increasingly digital world, there is an urgent need to establish a robust global digital governance to mitigate the cyber threats that pose imminent risks to both economy and security.

ASEAN and its partners in the EAP region should promote this framework in the G20. It can have far-reaching effects on other regions by setting precedents and establishing international norms. Several G20 members are influential countries in East Asia, notably the PRC, Japan, the Republic of Korea, Australia, and Indonesia. These nations have interest and capacity to further advance the framework in the G20. The G20's influence can pave the way for harmonized standards and regulations, making the East Asian market more stable and competitive. Furthermore, it could promote fair trade practices and reduce the weaponization of economic policy as a geopolitical tool. This would be conducive to fostering a collaborative and unified approach in addressing global challenges, ranging from economic disparities, and security threats to environmental crises.

11.7 Conclusion

The geopolitical landscape has undergone significant shifts in the last decades, with the rise of the PRC and the relative decline of US dominance. This has led to increased major power rivalries, particularly between the US and the PRC, which have far-reaching implications for the ASEAN region and East Asia as a whole. Furthermore, the major power rivalry has caused divisions within ASEAN. Economically, the fragmentation of the global economy has disrupted trade relations and supply chains. Governments have responded with industrial policies aimed at promoting domestic industries and reducing economic dependence on other nations.

The increasing number of integration initiatives in the region, while intended to promote regional cohesiveness, could inadvertently exacerbate divisions if not properly managed. ASEAN-led economic and regional architecture such as the AOIP and the RCEP have different sets of economic and geopolitical characteristics compared to other initiatives like the CPTPP, the BRI, and the IPEF, which are partner driven. Therefore, ASEAN and East Asia need to identify the key opportunities and challenges in navigating the geopolitical dynamic of each initiative in the region.

In order to navigate the current geopolitical landscape and promote regional cooperation, there is a need for a comprehensive security framework in ASEAN. ASEAN, as the center of regional cooperation, needs to recognize the intertwined nature of economic and security domains. However, the compartmentalized nature of ASEAN's institutional framework, divided into political-security, economic, and socio-cultural pillars, has hindered a comprehensive approach to regional challenges. Additionally, the comprehensive security framework should address the existential challenge of climate change. The region is vulnerable to climate risks, and geopolitical rivalries can undermine collaborative efforts to combat climate change.

In short, ASEAN needs a comprehensive security framework that integrates economic, military, and existential elements. It should expand on the concept of nontraditional security and recognize the equal importance of cooperation and interdependence. This comprehensive framework should encompass three important elements: peace, prosperity, and resilience. ASEAN must engage its partners to uphold a comprehensive approach to security based on multilateral principles and open regionalism.

An important step toward advancing a comprehensive security approach is to expand the TAC in Southeast Asia that aims to promote perpetual peace among Southeast Asian countries and cooperation in various fields. ASEAN-led platforms have the potential to make it more operationalized and to promote a comprehensive security framework. The RCEP presents an opportunity to bridge gaps between major powers in the region and build political confidence and trust. The economic cooperation agenda within the RCEP can go beyond capacity building and technical cooperation, to facilitate deeper economic and political cooperation, providing a platform for achieving consensus and support for a comprehensive security approach.

The EAS, another ASEAN-led platform, should play a greater role in norm-setting and institution-building centered around peaceful dispute resolution, respect for sovereignty, and commitment to regional stability. The forum can advocate for economic interdependence as a means of ensuring stability and promoting collaborative efforts, including regional economic initiatives, trade agreements, and investment projects. The proposed comprehensive security framework could become a key deliverable at the EAS Summit this year under Indonesia's chairmanship.

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CHAPTER 12

ASEAN's Voice in the G20: Enabling Trade Integration and Global Value Chain Resilience in Developing Economies

Anita Prakash

12.1 Introduction

In recent decades, developing and emerging economies have led global growth. Between 2000 and 2018, Asia averaged 7.4% gross domestic product (GDP) growth per year, and Africa 4.6%, compared to 1.8% in OECD countries (AUC and OECD 2019). In 2008, the weight of developing and emerging economies in the global economy tipped over the 50% mark for the first time (OECD 2018). International governance mechanisms and institutions from North to South have yet to fully reflect and adapt to this shift in the geography of the global economy.

The international community takes time to craft a new cooperation system. A gradual approach based on lessons learned can allow establishing equal footing cooperation models that will be more efficient in the face of current and future global challenges. Coordination and synergies across existing governance mechanisms and institutions therefore become a common enabler of growth and resilience among developing and emerging markets, working in close compact with the developed and mature economies.

12.2 G20 for Growth and Resilience in Developing Economies

The Group of Twenty (G20), can provide a strategic space to host discussions and strategic actions for ensuring growth and resilience in the key development sectors of trade, agriculture, and infrastructure among developing countries within and outside the G20.

The G20 is an intergovernmental forum of the world's major developed and developing economies. It comprises 19 countries (Argentina, Australia, Brazil, Canada, People's Republic of China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, the Russian Federation, Saudi Arabia, South Africa, Türkiye, United Kingdom, United States) and the European Union (EU). Collectively, the G20 accounts for 85% of global GDP, 75% of international trade, and two-thirds of the world population, making it the premier forum for international economic cooperation. From the Association of Southeast Asian Nations (ASEAN), Indonesia is currently part of the G20 troika (current, previous, and incoming G20 presidencies) comprising India, Indonesia, and Brazil, respectively. This is the first time when the troika consists of three developing countries and emerging economies, providing them a greater voice.

The G20 involves key actors in the global arena. It includes countries from North to South, which combine different experiences in international cooperation. G20 summits have become an important platform for policy debate and provide major policy directions on major global issues such as multilateralism, globalization, the United Nations Sustainable Development Goals (SDGs), climate change, global value chains, digital economy, industry 4.0, connectivity, quality infrastructure, financial inclusion,

women and youth entrepreneurship, among others. Developing economies have been gifted with an opportunity where, starting with Indonesia in 2022 and India in 2023, four developing economies will chair the G20 and its agenda between 2022 and 2025, spread across Asia, South America, and Africa. The four G20 presidencies—Indonesia, India, South Africa, and Brazil are leading emerging markets from diverse regions of the world and provide opportunities for strengthening the G20 development agenda. These G20 presidencies, starting from 2022 in Indonesia, will promote inclusion and help mobilize issues before ASEAN member states and bring forth common voices on economic growth; trade and investment; supply chains; digital economy and digital divide; human skill development through health, education, and social protection agenda; sustainable and inclusive finance; sustainable development and climate action; and other important fields of international cooperation.

Existing and incoming presidencies, which are also developing economies, can bring a new perspective to the conversation around rethinking global action, moving beyond existing "semantics", tools, and conventions. The G20 process could include a space where international stakeholders can experiment new forms of cooperation on global challenges, starting by understanding the results and impact of past G20 initiatives as stated in their declarations.

The ASEAN Voice in the G20 is ably carried out by the development agenda in the Sherpa Track and the working group meetings of trade and investment, agriculture, and infrastructure—three most important sectors that underpin growth and resilience of economies in developing countries in general and of ASEAN in particular.

12.3 Indonesia's Presidency: Highlighting ASEAN and Developing Economies' Need for Resilient Growth and Integration into the Digital Economy

Held in the recovery phase of the COVID-19 pandemic, Indonesia's presidency of the G20 ushered in the growth and resilience agenda for developing economies in the G20 working groups in full measure. Indonesia also had to weigh in the conflict in Europe and its effects on the global supply chains, food security, energy security, and in sum the consensus for cooperation and development among members. The message from its presidency would also shine a light on the aspirations of countries outside the G20.

Strengthening of global health architecture was important for Indonesia as the pandemic was not yet over and the world, especially the ASEAN and other developing economies were to prepare the world to respond better and have the capacity to deal with future health crises (MOFA Indonesia 2022). Digital transformation was identified as one of the key solutions in moving the economy during a pandemic and as a new source of economic growth. The Indonesian presidency focused on enhancing digital skills and digital literacy to ensure an inclusive digital transformation for all. Finally, energy transition toward new and sustainable energy by prioritizing energy security, accessibility, and affordability was a major deliverable from Indonesia. It brought forward the discussions on green and sustainable future and to manage the climate change issues more effectively through global cooperation.

ASEAN and East Asia are manufacturing hubs with close trade relations in the region, and with important markets in the EU and the United States (US). Such trade integration has been achieved through supply chain efficiencies and market demands in which seamless connectivity plays an important role. Supply chains in ASEAN and East Asia rest on a stable foundation of trade and investment links. To the extent that there are risks, they are primarily at a micro level.

The Indonesian presidency declarations were aimed at global cooperation that would help the supply chains in Asia, and other developing region, remain resilient to changes in the international trade dynamics (G20 2022a).

Based on the global competitiveness of the ASEAN economy and its integration into the regional and global value chains (GVCs), GVCs were recognized and endorsed as important means of increasing the participation of developing and least developed countries, and micro, small, and medium-sized enterprises (MSMEs) in global trade, playing a pivotal role in facilitating access to knowledge, capital, and diffusion of technology beyond the domestic economy. The presidency also recognized GVCs' significant contribution to addressing challenges in reducing poverty and offering new sources and opportunities for jobs and growth.

MSMEs are an integral part of ASEAN's economy. The MSME sector in ASEAN was the worst affected during the COVID-19 pandemic. Indonesia's presidency of the G20 reiterated the critical role of MSMEs in the economy and highlighted the importance of assistance programs to strengthen the capacity of MSMEs, women and young entrepreneurs to participate in international trade, and regional and global value chains. The G20 also accorded support toward the full implementation of WTO Trade Facilitation Agreement (G20 2022a).

ASEAN and other countries in developing Asia, including the least developed countries (LDCs), have deepened their integration in regional value chains and embarked upon trade-led growth. Given the pandemic-induced accelerated pace of technological restructuring of production and supply chain management, these economies must undertake digital transformation and structural reforms to stay engaged in the value chain of the digital economy, which increasingly utilizes automation, robotics, and artificial intelligence. The ASEAN member states have achieved varying levels of participation in the digital economy through national plans, and support from regional initiatives such as the ASEAN Information and Communications Technology Masterplan 2020 and the ASEAN Comprehensive Recovery Framework. Increased investments in digital connectivity and human capital will be the key to the restructuring of the GVCs and participation in the digital economy in ASEAN and developing Asia. In addition to ongoing trade facilitation and investment facilitation, concerted international cooperation is required to cover a spectrum of needs—infrastructure, regulatory frameworks, data flow, and security being the immediate challenges.

Indonesia's presidency of the G20 underlined the urgency for digital transformation that cannot be delayed. The G20 recognized the opportunities offered by digital transformation for resilient, sustainable, and inclusive economic growth and the importance of supportive and collaborative digital trade policies and digital technology for managing the risks and challenges associated with digital advancement, sustaining economic activity, and speeding up economic recovery. The chair's statement of the trade ministers meeting encouraged approaches to digital trade that are inclusive and ensure no one is left behind.

Effectively, the Indonesian presidency made the perfect pitch for the G20 as the voice of the developing world. In trade, agriculture, and infrastructure, it was able to align the G20 consensus (or the ministerial statements) with the SDGs. Moreover, Indonesia was able to bring the objectives of ASEAN Economic Community to the forefront where the leaders emphasized cooperation for regional supply chains, food security, connectivity, and sustainable infrastructure. The roadmap for a digital community was also emphasized by the Indonesian presidency as the future competitiveness of ASEAN lies in greater participation in the value chains of the digital economy.

12.4 G20 in India: ASEAN Benefits from the Presidency's Objectives of Development and Growth for All

Early in 2023, India announced that its presidency will ensure the centrality of the voice of the South in every working group meeting of the G20. The sectoral working groups and the sherpa track facilitated a consensus statement in the G20 summit meeting held on 9–10 September in New Delhi. The Leaders' Declaration reiterated the core themes of reviving global growth and coordinated action for food and energy security, environment, health, and digital transformation.

From the ASEAN perspective, the continuity of the theme of growth and resilience of economies in developing countries has been ensured in the all-important Finance track and in the trade and investment working group.

The G20 International Financial Architecture Working Group Meeting (IFA WG), which reports to the Finance Track under India's presidency, has met three times at the time of the writing of this chapter. Jointly steered by the Ministry of Finance and the Reserve Bank of India, France and the Republic of Korea are the cochairs of the IFA WG.

Working toward the resilience of the global economy, and that of developing economies in particular, the IFA WG is preparing for strengthening the global financial safety net and strengthening financial resilience through sustainable capital flows, among other outcomes. Members recognized the need for multilateral development banks (MDBs) to strengthen and evolve to address transboundary challenges. There was a shared understanding among members on the urgency to address debt vulnerabilities and find pragmatic solutions to strengthen coordinated policy action to address the worsening debt situation. Members also discussed how climate change-related policies can impact capital flows and the macro-financial impact of the widespread adoption of central bank digital currencies on the international monetary system.

Discussions from the meeting helped in finalizing the outcomes of the IFA WG submitted to the G20 Finance Ministers and Central Bank Governors (FMCBGs). The FMCBGs' recommendations on the restructuring of multilateral development banks (MDBs) was included in the G20 New Delhi Leaders' Declaration (G20 2023).

12.5 Trade, Investment, and Global Value Chains

The Trade and Investment Working Group (TIWG) has assessed the global economic scenario where growth and prosperity have both slowed down, and even reversed in many economies. Working in the face of recent developments in the world economy—mounting macroeconomic instability, geopolitical tensions, and the lingering effects of the pandemic—the TIWG is focused on factors adversely affecting the supply chains and predictability of global trade, and thereby aggravating poverty and inequality in developing and LDCs. The meeting records so far show that the G20 countries are working for solutions to accelerate inclusive trade by expanding opportunities for developing countries and LDCs. The TIWG has from the very beginning focused on working together for resilient GVCs among members and nonmembers of the G20.

The challenge before the TIWG, however, is to propose measures to increase developing countries participation in GVCs and also to improve the quality of participation by positioning the developing economies in high-value-added parts of the value chains. At the G20, inclusive GVCs have received considerable focus in the previous presidencies too. In 2016, under the People's Republic of China

(PRC's) presidency, the G20 identified the need for capacity building, technological support, infrastructure building, and access to credit to promote inclusive GVCs. With India as the second of the four emerging markets to steer the G20 presidency, the G20 countries have an opportunity to continue this focus by identifying specific areas that are impacted by recent macroeconomic and geopolitical developments to offer necessary policy support and promote higher GVC participation from developing countries.

India's presidency has recognized the COVID-19 pandemic induced shocks and disruptions to the GVCs and has sought to focus on mechanisms that ensure quick response to such disruptions. It is understood that the TIWG is working on outcomes that are responsive to natural disasters such as the pandemic, along with other recent geopolitical tensions and emerging environmental risk trends and highlight the need for global cooperation to build resilience within the supply chains.

Previous G20 presidencies too have focused on critical sectors as a step toward achieving resilience. For instance, Argentina's G20 presidency in 2018 identified agro-food global value chains as a critical focus area to achieve a sustainable food future. Similarly, Italy's G20 presidency in 2021 identified the importance of resilient and reliable global supply chains across the whole value chain related to health emergencies in the context of COVID-19. Taking these efforts forward, the TIWG aims to deliver mechanisms for visualization of supply chain networks with improved transparency that can help identify future vulnerabilities in critical sectors. Robust data and analyses, backed by timely dissemination and ease of utilization through visualization tools, will likely aid policy action aimed at making GVCs resilient.[1]

It is expected that the TIWG in India will work toward the identification and promotion of a research-based GVC mapping framework that can facilitate the simplification of complex information concerning GVCs and present it in an intuitive manner with the aid of visualization tools. Such a mapping framework can help in tracking short, medium, and longer-term trends in GVCs, develop early warning systems, and reduce the vulnerability of firms and their supply chains, while capturing the complexity at various levels. Such a framework can help identify opportunities for improving efficiency, enabling flexibility, and building resiliency within GVCs.

Research and data granularity through collaborative efforts is being considered to ensure a framework for GVC resilience that can be leveraged and further developed by the G20 countries with multilateral institutions supporting the G20.

The focus is also on the MSMEs, which are the backbone of ASEAN's economy. India's G20 presidency is especially working on the role and importance of digital technology and technology-based tools, along with appropriate policy and institutional reforms, for enhancing MSMEs access to information, finance, and markets, and for creating a conducive environment for MSMEs to leverage emerging technologies for enhancing their integration in global trade. Access to information on markets, tariffs, and nontariff measures, and logistical and financial information is a recurring demand from MSMEs globally in their efforts to internationalize. The discussions so far have recognized that MSMEs, particularly in developing countries lack the requisite resources to collect and analyze all the relevant information for their target markets and that MSMEs' participation in global trade is hampered by asymmetric market information. The TIWG is actively working toward addressing the capacities for the MSMEs in the developing economies. ASEAN will be a beneficiary of such initiatives.

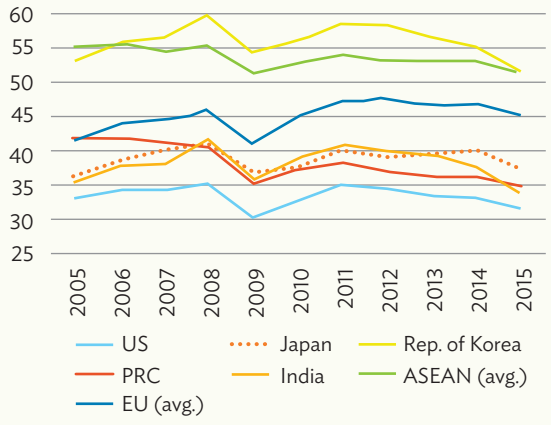
[1] Trade and Investment Working Group, Concept Paper Priority Issue 2: Trade and Resilient Global Value Chains. March 2023. pp 3–4. (Restricted Circulation)

12.6 ASEAN and G20: Working Together for Trade for Prosperity and Resilient Global Value Chains

ASEAN's position in the global economy is recognized by the G20 and ASEAN is a permanent invitee to the G20 meetings. More than the size of the economy, it is the varied levels of development among the ASEAN member states that makes ASEAN a formidable voice in the G20 deliberations. In the years following the global financial crisis, the G20 deliberations were geared toward reviving and leveraging the global financial architecture. However, with greater emphasis on the development agenda, including efforts to bring developing Africa closer to the G20 agenda, the G20 is becoming a significant platform for inclusive development. The inclusion of the African Union (AU) in the G20 in India's presidency is the right step in this direction.

In this context, ASEAN's presence in the G20 must be leveraged further for enhancing the role of trade and investment in the prosperity and resilience of the ASEAN Economic Community. It is one of the most open economic regions in the world, and its economies are growing faster than the rest of the world and are converging in terms of production capacity as well as purchasing power. However, the degree of openness is decreasing as domestic demands grow. At the same time, ASEAN is under growing pressure to raise its productivity. ASEAN needs to improve its participation in the global value chains in light of changing demands from the manufacturing sector, the growth of environmental and green goods, and the goods and services of the digital economy.

Figure 12.1a: GVC Participation of ASEAN, by Economic Area (% of gross exports)

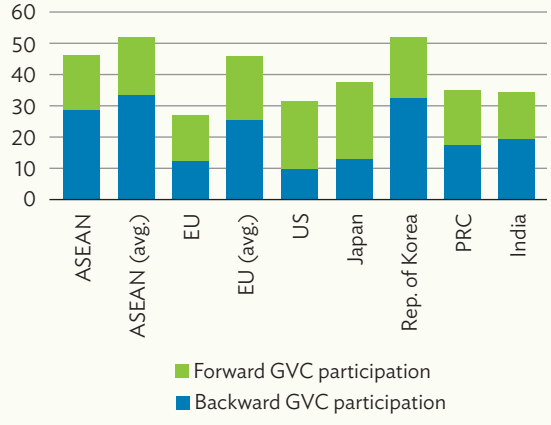


ASEAN = Association of Southeast Asian Nations, avg. = country weighted average, EU = European Union, GVC = global value chain, PRC = People's Republic of China, US = United States.

Notes: ASEAN refers to eight of its 10 member states: Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. EU refers to the member countries as of 2013–2019.

Source: OECD TiVA Database.

Figure 12.1b: GVC Participation of ASEAN, by Economic Area and Type, 2015 (% of gross exports)



ASEAN = Association of Southeast Asian Nations, avg. = country weighted average, EU = European Union, GVC = global value chain, PRC = People's Republic of China, US = United States.

Notes: ASEAN refers to eight of its 10 member states: Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. EU refers to the member countries as of 2013–2019.

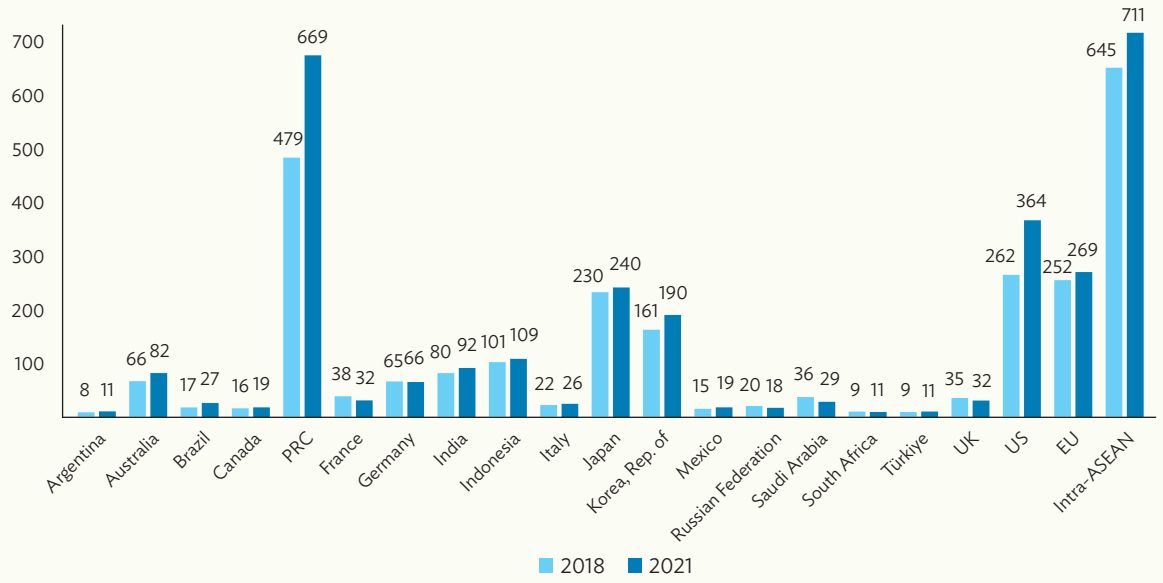
Source: OECD TiVA database.

The ASEAN example is particularly important as it provides a snapshot of trade integration between the different economies in Asia and as an economic community of member states that have differently sized economies, industrial bases, and levels of participation in the regional value chains (Figures 12.1a and 12.1b). The ASEAN+3 region—comprising the 10 ASEAN member states, the PRC, Japan, and the Republic of Korea—provides the most vibrant GVC integration in Asia. Moreover, ASEAN has been the fulcrum of trade and investment linkages from partners within and outside Asia, most of those being members of G20 (Prakash 2023).

The current troika of the G20 is composed of the previous, present, and successive chairs, i.e., Indonesia, India, and Brazil, respectively. Among these, Indonesia is a founding member state, while Brazil is a sectoral dialogue partner of ASEAN. As the troika is designed to extend seamless continuity to the G20 agenda, India's G20 presidency provides an invaluable window for ASEAN member states to put their concerns and priorities on the table as the geoeconomic and climate change-induced uncertainties that are hurdles to achieving a sustainable, prosperous, and inclusive future for the region.

Additionally, many of ASEAN's dialogue partners, such as Australia, the PRC, Japan, the Republic of Korea, the Russian Federation, the UK, the US, and the European Union, are also G20 members, giving them yet another platform to align their bilateral engagements within a larger perspective suitably. Figure 12.2 showcases the size of ASEAN's trade with the G20 member countries.

Figure 12.2: ASEAN Trade in Goods with G20 Members and Intra ASEAN, 2018 and 2021
($ billion)



EU = European Union, PRC = People's Republic of China, UK = United Kingdom. US = United States.

Source: ASEANStats, International Merchandise Trade Statistics (accessed 15 June 2023).

It is important to note that intra-ASEAN trade is among the highest when compared with other ASEAN's trade with the G20 member countries. However, intra-ASEAN trade is showing trends of slowdown, or even stagnation. Between 2018 and 2021, intra-ASEAN trade decreased from 23% to 21% of its total trade. During the same period, its trade with rest of the world grew from 77% to 79% of its total trade (ASEANStats). Trade integration is important for ASEAN, especially participation in GVCs. By type of participation, the share of foreign value added in gross exports—or backward integration—accounts for almost two-thirds of ASEAN participation in GVCs, stressing its global upstream position as final exporter. This contrasts with the predominant role of the share of domestic value added in foreign exports—or forward integration—in the US and Japan, both specialized in intermediate exports.

Significantly, ASEAN's trade integration has progressively shifted away from developed to developing economies. The PRC–ASEAN and intra-ASEAN GVC integration is more prevalent, although a partial recovery with the EU has been noticeable since 2010. However, ASEAN's bilateral integration has changed over the years, positioning ASEAN more upstream with respect to the EU and downstream with respect to the PRC, accounting for greater participation of PRC's inputs in ASEAN exports. It is important for ASEAN, and for rest of the world, to work towards a relatively symmetrical participation in value chains. To that extent, the ASEAN experience of openness to trade and GVC participation must be shared as the joint voice of the LDCs, developing, and middle-income countries in the G20 for drawing out the key principles for GVC resilience and trade for prosperity.

12.7 ASEAN–India Relations: Leveraging the G20 Objectives of India's Presidency

The ASEAN chair country, the ASEAN Secretariat, and Singapore are permanent invitees to the G20. India has invited Singapore as a guest country to the G20 Summit while extending an invitation to the ASEAN Secretariat and its institutions even when the current ASEAN chair, Indonesia, is a G20 member. India aims to deliver an inclusive G20 presidency and articulate the concerns of the Global South (Shringla 2023).

Since India began its formal engagement with ASEAN in 1992 in the capacity of a sectoral dialogue partner, the partnership has deepened with cooperation on multiple fronts, ultimately leading to the elevation of the previously existing strategic partnership to a comprehensive strategic partnership at the ASEAN–India Commemorative Summit last year, which also marked the 30th anniversary of ASEAN–India relations. Starting in Indonesia, ASEAN now has the best opportunity to put forth its voice with the important declarations in India's presidency—to ensure trade for prosperity and resilient value chains in and outside Asia.

ASEAN is led by Indonesia in the troika of the G20. Indonesia is also the chair of ASEAN in 2023. Such conjunction of roles is rare in the multilateral economic forum. Indonesia's 2023 ASEAN chair carries the theme: "ASEAN Matters: Epicentrum of Growth". This is meant to promote ASEAN's economic potential to global trade and investment partners, and to provide the support to the global agenda for resilient GVCs.

ASEAN leads by example as it has been able to retain much of its supply-chain connectivity in the post-COVID-19 period. It is still early to say to what extent GVC integration has been affected by the COVID-19 pandemic, as rigorous data will only be released after a delay of some years (Shepherd and Prakash 2021). But all economies in ASEAN, developed and developing, are now more engaged in rebuilding and rebalancing trade and investment. The ASEAN region faces major potential change in conditions facing GVCs in the rise of the digital economy, environmental products, electric vehicles,

and goods suited for increasingly carbon-neutral societies. Recovery programs in high-income markets will favor this shift through incentives and other measures. ASEAN is well positioned to take advantage of these opportunities, with some important incentives of retooling.

ASEAN can bring to the G20 the importance of keeping markets open, an effective supplier network, and integrated GVCs as important advantage in developing the GVCs of the future. The G20 platform in turn can ensure the principles, framework, and resources for resilient and efficient GVCs and trade for prosperity of all.

12.8 Moving Ahead to Brazil and South Africa Presidencies

In moving forward from India's presidency, ASEAN must not allow the tyranny of distance to Brazil and South Africa overtake its zeal in participating in the development agenda in the G20. The financial architecture development amid governments' budget tapering and budgetary discipline requires governments to ensure a smooth transition process, and more so for the developing and least developed countries. The scarring effect of the pandemic on the real and financial economy, and prospects of asymmetric recovery pathways from health and economic crises have both domestic and international aspects and will require a longer-term and sustainable perspective on recovery and growth. Sustainable economic solutions including sustainable finance, framing policy response for participation in the new digital economy, and ensuring positive outcomes for the MSMEs will be important features of the recovery pathways. All these find resonance in the ASEAN recovery and rebuilding plans too.

Besides governments, the international organizations supporting the G20 work are also playing an active role. The Economic Research Institute for ASEAN and East Asia, together with the Institute for Economic and Social Research – Faculty of Economics and Business, University of Indonesia, and the Research and Information System for Developing Countries have set up the G20 Research Forum for facilitating the priorities of the Indonesian and Indian presidencies in 2022 and 2023 on important development issues through academic and policy research contribution to the sectoral meetings of the G20 in Indonesia and India, and build on the work in successive presidencies thereafter, especially Brazil and South Africa (G20 2022b).

Indonesia led the theme on strategies for growth in the post COVID-19 pandemic recovery phase which is likely to continue until 2025. The G20 Research Forum has helped to roll out Indonesia's theme into India's chair year in 2023 and will also work later in the South Africa and Brazil presidencies. Since all four countries are emerging markets, working around the chairs' priorities will resonate with all four countries and ensure continuity.

ASEAN and the G20 can "walk the talk" on development and prosperity together, which are at the core of ASEAN Community Vision 2025, with a special emphasis on trade and investments and participation in the global value chains.

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CHAPTER 13

ASEAN in the Global Economy

Lili Yan Ing and Ivana Markus

13.1 ASEAN: Then and Now

The Association of Southeast Asian Nations (ASEAN) established on 8 August 1967 is a group of 10 Southeast Asian countries: Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam. ASEAN has now emerged as a major economic bloc in the global economy. In 2022, ASEAN with a population that accounted for 9% of the world's total population contributed 3.6% to world nominal gross domestic product (GDP) (or 6.4% in terms of purchasing power parity). This significant economic presence is driven by the region's abundant natural resources and large and dynamic population. Amid the current global uncertainty, ASEAN is projected to grow at 4.6% in 2023, compared to 2% for the global growth in the same period (EIU 2023).

ASEAN was established with the main aims and purposes of economic, technical, educational, social, and cultural cooperation to promote regional peace and stability through abiding respect for justice and the rule of law and adherence to the principles of the United Nations Charter. On 15 December 2008, the ASEAN Charter came into force and through the documents, ASEAN operates under a new legal framework to boost its community-building process. The commitments of ASEAN include three main pillars of political, economic, and people-oriented commitments.

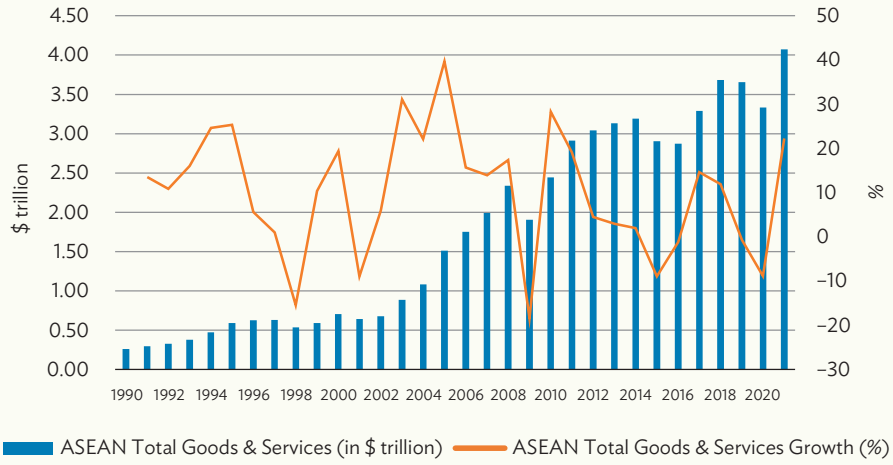
On the economic front, ASEAN aims to become a production hub in the region with free flows of goods, services, and investment. On trade in goods, in January 1992, ASEAN established the ASEAN Free Trade Area (AFTA) to eliminate tariffs and nontariff barriers among members. It was seen as an effort to integrate the ASEAN economies into a single production base and create a regional market (ASEAN 2002). AFTA requires tariff rates levied on various products traded within the region be reduced to no more than 5%, quantitative restrictions and other nontariff barriers are to be eliminated. AFTA serves as a catalyst for greater efficiency in production and long-term competitiveness.

On services, ASEAN developed the ASEAN Framework Agreement on Services (AFAS) in 1995. AFAS aims to enhance cooperation in services among the ASEAN member states to improve efficiency and competitiveness, diversify production capacity, supply, and distribution of services, eliminate restrictions to trade in services, and liberalize trade in services (ASEAN 1995). AFAS provides ASEAN commitments in service liberalization in the region in a consistent manner with the General Agreement on Trade in Services (GATS), AFAS covers 128 subsectors of the 155 subsectors on the GATS (La 2021). Through a negotiations package of AFAS, ASEAN has been increasing the region's level of service liberalization.

On investment, along its milestone on trade in goods and services, in 2009, ASEAN signed the ASEAN Comprehensive Investment Agreement (ACIA) that aims to create a free, open, transparent, and integrated investment in the region. The ACIA came into effect in March 2012, which offers multiple benefits to ASEAN investors under the four pillars: liberalization, protection, promotion, and facilitation, with the aim to ensure that businesses and investors can have certainty in foreign equity caps and other requirements in foreign direct investment (FDI) and investment landscape in the region to support the flows of investment within and with ASEAN's partners.

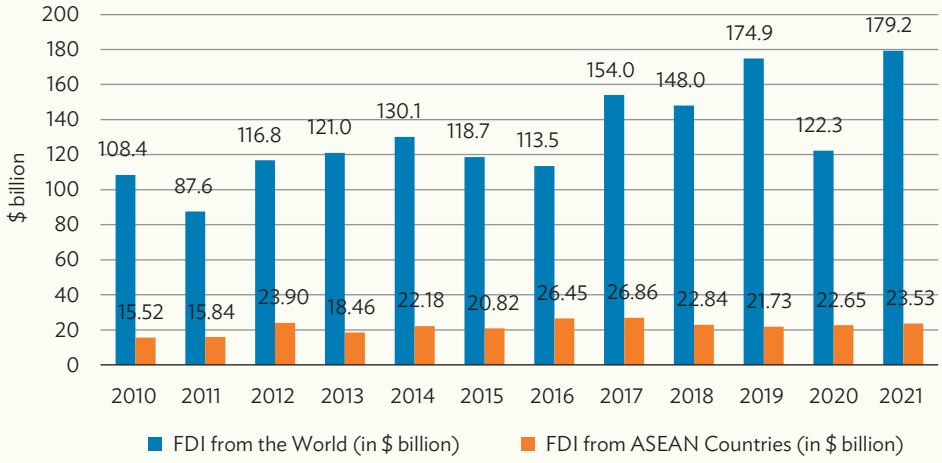
Figures 13.1 and 13.2 show ASEAN's trade and investment. Figure 13.1 illustrates ASEAN's total trade in goods and services, both its value (left hand side) and its growth (right hand side). Post AFTA and AFAS, the growth of trade in goods and services in ASEAN increased from around 10% in 1992 to more than 25% in 1995. Figure 13.2 shows that the FDI flows from the world into the ASEAN region is increasing from time to time despite several fluctuations in some years. After the ACIA came into force, the ASEAN experienced an increase in its FDI flows both from the ASEAN countries and the world. As seen in the figure below, in the year when ACIA came into effect, 2021, the FDI flows to the region increased from $15.8 billion (from ASEAN countries) and $87.6 billion (from the world) to $23.9 billion and $116.8 billion, respectively. Despite the fluctuations, almost a decade after ACIA, the FDI flows from the world increased to $179.2 billion in 2021.

Figure 13.1: ASEAN Total Trade in Goods and Services, 1990–2021



Source: Authors' calculation based on UNCTAD Data (accessed 2 June 2023).

Figure 13.2: ASEAN Foreign Direct Investment, 2010–2021



FDI = foreign direct investment.

Source: Authors' calculations based on ASEANstats and UNCTAD Data (accessed 6 April 2023 and 2 June 2023).

Moreover, economically, it is important for ASEAN to maintain its mutual interconnections in East Asia. Over the last 2 decades, the share of intra-ASEAN trade as a percentage of ASEAN's total trade with the world has remained stagnant, fluctuating between 22% and 23%. In 2022, intra-ASEAN trade accounted for 22% (ASEANstats 2023, https://www.aseanstats.org/). The optimistic view is that while intra-ASEAN trade may have shown limited growth, ASEAN's exports to the rest of the world have been increasing. It is indeed true that the share of ASEAN's goods exports to the world as a percentage of total world trade has risen from 6.4% to 7.8% between 2000 and 2022 (EIU 2023).

The relatively stagnant intra-ASEAN trade over the last 2 decades is the result of the region's "shallow integration." There are at least three reasons that explain the stagnation of intra-ASEAN trade. First, most ASEAN products are substitutes rather than complements, which limits the potential for increased intra-ASEAN trade. Second, this issue is more technical, as regulations and procedures concerning rules of origin and nontariff measures may be perceived as trade barriers. It is important to recognize that nontariff measures are implemented with the intention of safeguarding health, safety, and the environment. But there are instances where the design and implementation of these measures can inadvertently hinder trade and investment. Third, ASEAN is not a self-contained region, it still relies on investment and technology from countries like Japan, the Republic of Korea, and the People's Republic of China (PRC).

Given the current situation of ASEAN, ASEAN's strategy should revolve around promoting and increasing intra-East Asian trade and investment, as well as to enhancing regional integration and economic cooperation. Indeed, ASEAN's trade and investment with East Asia must be at the core of ASEAN's trade and investment growth strategy. ASEAN aspires to become a production hub in the region, facilitating the movement of goods, capital, and skilled labor. An advantage of ASEAN is that it is not a Customs Union. While ASEAN countries function as a united group, they also retain the freedom to engage with other countries or blocs. This flexibility enables ASEAN member countries to pursue their interests and derive benefits from diverse partnerships and agreements, all the while upholding the unity and coherence of the ASEAN Community.

To enhance its economic engagement, ASEAN has integrated not only with its member states, but also with its main trading partners by initiating free trade agreements (FTAs) with other countries and known as ASEAN+1 FTAs. Table 13.1 shows the ASEAN Agreements. Besides AFTA, AFAS, and ACIA, started in 2004, ASEAN added several ASEAN+1 FTAs: ASEAN–PRC FTA, ASEAN–Republic of Korea FTA, ASEAN–Japan FTA, ASEAN–Australia–New Zealand FTA, and ASEAN–India FTA. It is found that the development of ASEAN+1 FTAs has a positive trade creation effect, particularly with the PRC, and negative trade diversion effects (Okabe 2015; Taguchi and Lee 2016). Trade creation is larger in the ASEAN–PRC FTA due to the wider gap of the general tariff rate with the preferential tariff rate in the FTA.

Table 13.1: ASEAN Agreements: Signing and Enforcement

Agreement	Signing	Enforcement
ASEAN Free Trade Area (AFTA)	January 1992	January 1992
ASEAN Framework Agreement on Services (AFAS)	December 1995	December 1995
ASEAN Comprehensive Investment Agreement (ACIA)	April 2009	March 2012
ASEAN–PRC FTA	November 2004	July 2005
ASEAN–Republic of Korea FTA	December 2005	June 2007
ASEAN–Japan FTA	April 2008	December 2008
ASEAN–Australia–New Zealand FTA	February 2009	January 2010
ASEAN–India FTA	August 2009	January 2010
Regional Comprehensive Economic Partnership (RCEP)	November 2020	January 2022

Source: Authors' compilation based on ASEAN Secretariat.

Together with the other five main trading partners in East Asian, ASEAN levelled up the cooperation into a regional comprehensive economic partnership (RCEP). It was concluded in November 2009 and came into force in January 2022. The RCEP is the world's largest regional free trade agreement which could play an important role in boosting trade and investment of the region and influence global trade (Petri and Plummer 2021; Armstrong and Drysdale 2022). The RCEP consists of the 10 ASEAN countries and Australia, the PRC, Japan, the Republic of Korea, and New Zealand. The RCEP is expected to induce trade liberalization of regional and global trade as well as addressing issues to improve overall trade and investment. For ASEAN, it could also enhance its position as the main hub and key economic player in the global economy and strengthen its significance as one of the main drivers of regional growth. In 2022, the RCEP countries comprise about one-third of the global population, global trade, and global FDI.

ASEAN has also been actively engaging internationally and shown its strong position as the regional leader while also promoting greater regional integration. On top of joining the RCEP, ASEAN has also been engaging with its partner countries, among others: the Belt and Road Initiative with the PRC to enhance economic cooperation, development, and connectivity; Indo Pacific Economic Framework for Prosperity (IPEF) with Japan, the Republic of Korea, and the United States, to promote Asia-Pacific region's peace and stability.[1] These engagements show ASEAN's efforts and commitment to take part in the global world and play an important role internationally.

13.2 ASEAN in the Global Economy

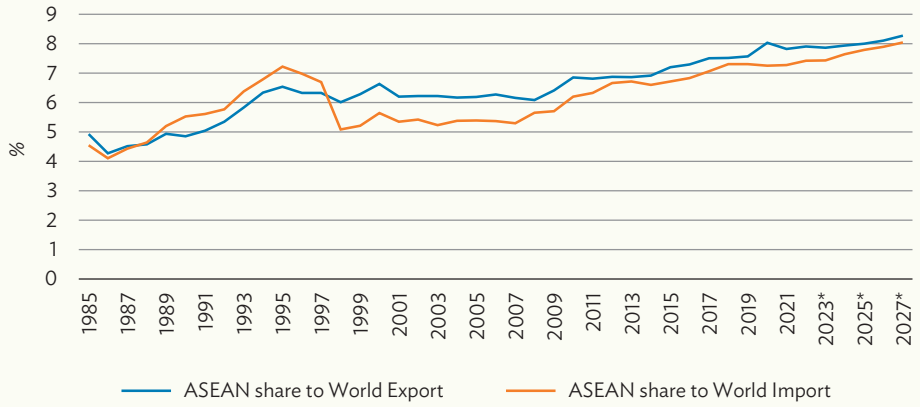
The rising geopolitical tensions notably since 2008 have greatly changed the landscape of the global economy, generating massive uncertainties and instabilities (Ing and Rodrik 2022). The ongoing trade conflicts and now extended to technology and security issues between two major economies the United States (US) and the PRC, the US and Europe decoupling with the PRC, and the war in Ukraine have created significant apprehension about the future of international trade and global economy. Despites these challenges, ASEAN has emerged as a major player in global trade.

Figure 13.3 illustrates the share of ASEAN exports and imports to the world's exports and imports and shows that in 2022, ASEAN accounted for 7.6% of the world's exports and 7.1% of imports of goods. ASEAN is projected to account for around 8% of the world's exports and imports by 2025. With a combined population of over 650 million and a rapidly growing middle class, ASEAN has become an attractive market. Not only trade, but ASEAN has also become an attractive destination for foreign direct investment (FDI).

Figure 13.4 shows that in 2022, ASEAN FDI accounted for 11.6% of the world's total FDI, demonstrating the region's appeal to investors. The growth of ASEAN's economy, combined with its strategic location and supportive business environment, has made it an increasingly popular destination for foreign investment. As ASEAN continues to integrate its economies and improve its business environment, it is likely that the region will continue to attract significant amounts of foreign investment in the years to come.

[1] Critics highlight that as an agreement, the IPEF is exclusionary and divisive as some countries in ASEAN—Cambodia, Lao PDR, and Myanmar—have been left out of the framework agreement. Furthermore, some critics contend that the IPEF primarily holds symbolic value and aims to appeal to US voters, rather than effectively implementing policies that would be advantageous to its member states (Ing 2023).

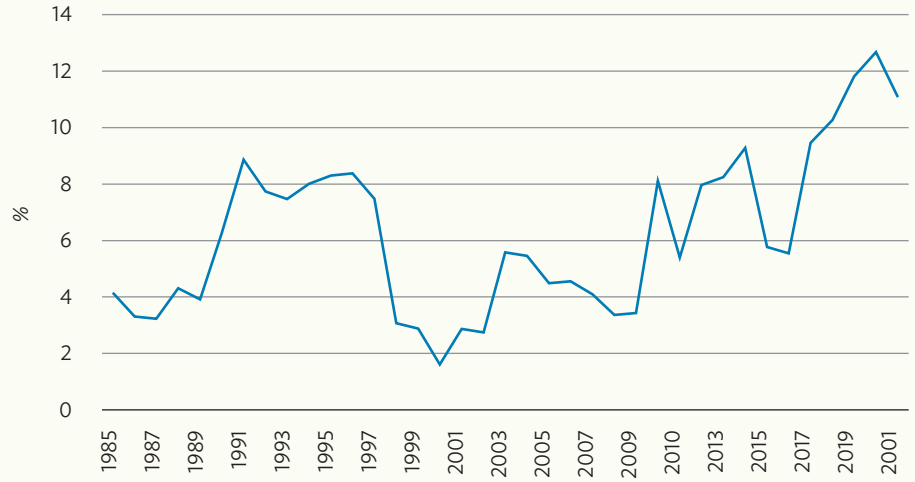
Figure 13.3: Share of ASEAN Exports and Imports to the World's Exports and Imports



Notes: *estimated numbers.

Source: Authors' calculation based on EIU Viewpoint Database (accessed 19 April 2023).

Figure 13.4: Share of ASEAN FDI Inflow to the World's FDI



FDI = foreign direct investment.

Source: UNCTADSTAT Database (accessed 17 April 2023).

The growing trend of ASEAN's trade and FDI at the global level also reflects the growing focus on ASEAN, along with the growing influence of Asia, particularly the PRC's economic rise. Despite the rising geopolitical tension in recent years, ASEAN's trade relations with its key partners keep growing. The tension could also serve as an opportunity for emerging markets, including ASEAN, to enhance their affluence in the global world. The growing trade and investment flows in the ASEAN region reflects the shift in economic power toward Asia, including ASEAN countries, that emerge as emerging major players.

ASEAN's total trade with the US has tripled from $131.6 billion in 2000 to $452.2 billion in 2022 and the total trade between ASEAN and the PRC also increased 24 times from $39.5 billion in 2000 to $975.3 billion in 2022. These numbers show rising trade between ASEAN and its trading partners, particularly with the PRC that has become ASEAN's largest trading partner. It is important for ASEAN to keep enhancing its participation in global value chains by maximizing its strategic location, large consumer market, and tapping into growing East Asia.

Moreover, the development of the digital economy, particularly during the COVID-19 pandemic, has amplified the advancement and application of digital technology, which has aided nations and companies in boosting productivity and enhancing economic progress. The global digital trade was recorded at $4.9 trillion in 2021 and $5.7 trillion in 2022, it is projected to reach more than $10 trillion by 2030 (Statista 2022a). ASEAN trade is expected to grow to $360 billion by 2025 and $1 trillion by 2030, contributing 10% of the global digital trade market.[2]

13.3 The Growing Influence of Middle-Power Countries

Over the decades, the US has been the global leader in several main fields, particularly in military, finance, trade, investment, science, and technology. However, the country has been experiencing a decline in its share as other countries around the world try to close the gap to the US situation, such as the PRC and other Asian countries, have been catching up and bridge the gap (Sachs 2016). Since the past world war, the world has undergone a significant transformation, starting from bipolarity between the US and the former Soviet Union during the Cold War to unipolarity of the US as the world's sole superpower (Peters 2022).

The world has evolved to a multipolar world with the rising significance of several countries and regions, such as the expansion of the grouping of Brazil, Russian Federation, India, the PRC, and South Africa (BRICS), the rising role of ASEAN, and the growing economies in other continents of Latin America and Africa. Over 3 decades, the role of developing economies[3] has continued to become more prominent in the global playing field. The share of GDP of developing countries to the world's GDP increased from 16.5% in 1990 to 37.7% in 2021. Likewise, the share of exports of developing economies to the total world's exports increased from 15.5% to 32% over the same period.

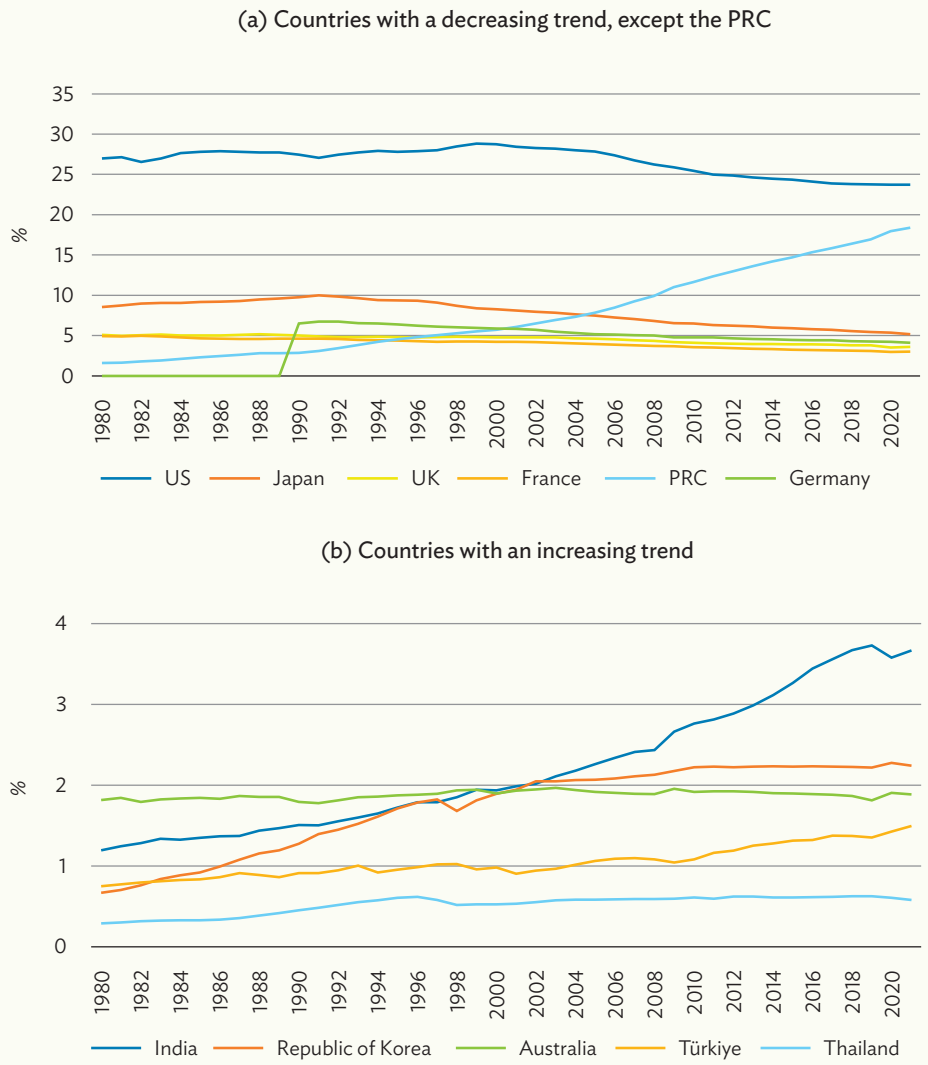
The world economy keeps globalizing and integrating, international trade and its policies are becoming more important to shape the dynamic of the global economy (Schwab and Smadja 1994). Particularly in the last 2 decades, middle-power countries have been continuously rising in importance to the world.

Figures 13.5 and 13.6 illustrate developing countries' catch up and growing significance of them in the world economy. Figure 13.5 illustrates the GDP share of selected economies. Figure 13.5(a) shows developed countries who have experienced decreasing trends in the ratio of GDP to total world's GDP, except for the PRC. In the 1980s, the US contributed almost 30% to the world's GDP, while other countries, except Japan that accounted 9%, contributed less than 5%. The PRC's share of GDP increased from 2% in 1980 to 18% in 2021. Figure 13.5(b) depicts countries with increasing share of GDP to the world's GDP. India and the Republic of Korea are also among the rising starts, even though their GDP shares are still relatively low, 3.2% and 2%, respectively in 2021. Through structural transformation, emerging economies have more opportunities to catch-up with the developed countries, including in their technology and digital adoption.

[2] The negative effects of the impacts of advanced technologies such as robots, AI, and digital technologies can be found in Kleinman and Vallance (2023), Ing and Grossman (2023), and Acemoglu (2021).

[3] Developing countries are defined based on a distinction between developing countries and developed regions that was commonly used in the past. The list of developing countries is available at UNCTADSTAT Country Classification. https://unctadstat.unctad.org/en/classifications.html

Figure 13.5: Share of GDP to World GDP, Selected Economies

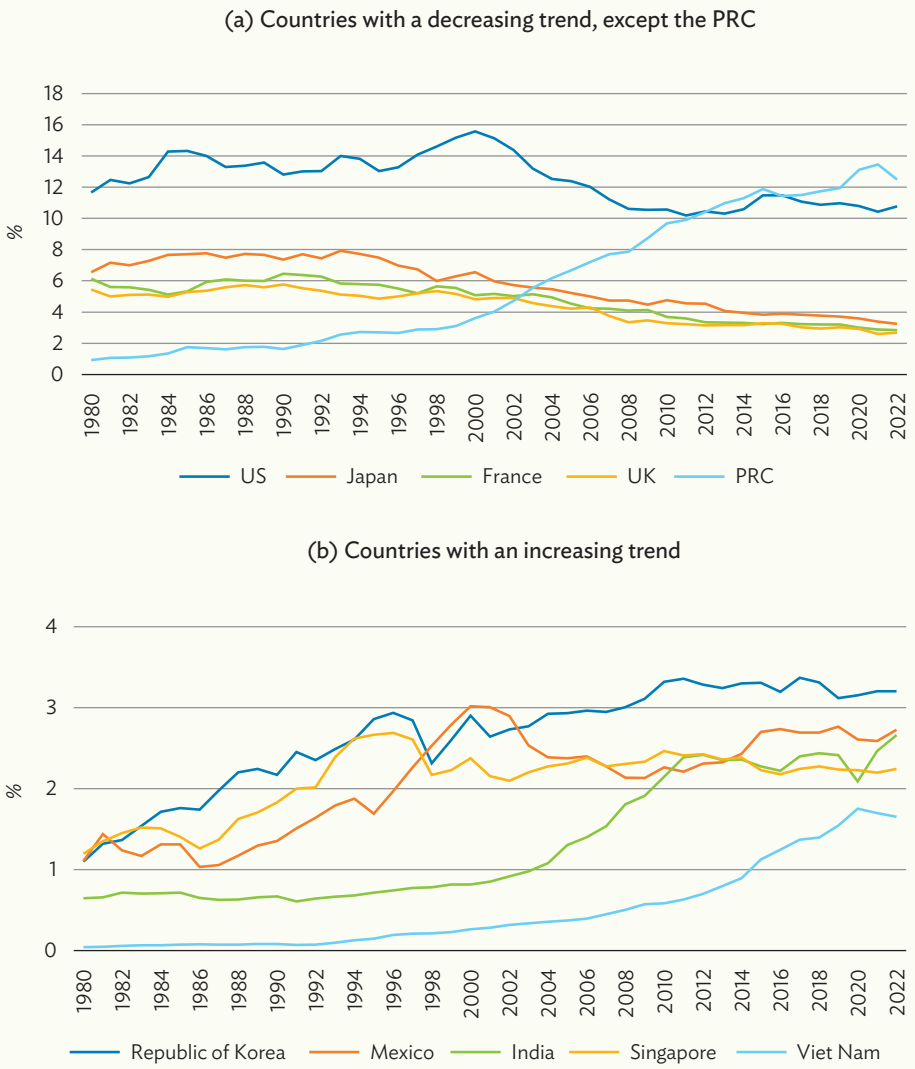


PRC = People's Republic of China, UK = United Kingdom, US = United States.

Source: Authors' calculations based on UNCTAD (accessed 5 June 2023).

On the merchandise total trade, over the last decades, developing countries have recorded an evident increase in their share of world trade. Figure 13.6 shows that countries in Asia, particularly the PRC and the Republic of Korea, recorded a significant growth in terms of its total trade share to the world. In 2016, the PRC's share of total trade surpassed the US's share total trade to the world and remains recorded a higher share of total trade than the US up until 2022. Other countries also emerge in their total trade share to the world, such as Mexico, India, Singapore, and Viet Nam. Studies have shown that the tariff and nontariff barrier elimination policies have been able to strengthen intra-region trade among the RCEP members, including those in ASEAN and East Asia (Li and Moon 2018; Rahman and Sharma 2023).

Figure 13.6: Share of Total Trade to World, Selected Economies



PRC = People's Republic of China, UK = United Kingdom, US = United States.

Source: Authors' calculations based on UNSTAT (accessed 5 June 2023).

Decades ago, Asia, particularly East Asia, had a less key role to the world's economy. However, the tremendous growth of many countries in East Asia has successfully made East Asia as the new emerging economies with its share of GDP to the world of 15% in the 1990s. Its influence and significance keep growing and currently, it accounts for around 27% of the world's GDP. The "Four Tigers" of Asia (Hong Kong, China; the Republic of Korea; Singapore; and Taipei,China) recorded phenomenal growth with sustained annual growth rates of output per person more than 6% in the 1960s (Sarel 1996), which were mostly driven by exports and rapid industrialization. In addition, The PRC also plays a key role in the rise of Asia to the global economy. The PRC has undergone tremendous economic and political transformation as it recorded a remarkable economic growth in the last decades. Major countries of Asia have also enjoyed the positive impact from the PRC's growing economy in their trade relations with the PRC.

In the 1970s, ASEAN's GDP share to the world was around 1%. It grew to 3% in 2021 and its population accounted for almost 9% of the world's total population. In terms of investment, ASEAN's share of FDI to the world's foreign direct investment (FDI) has witnessed a significant increase from only 3.5% in 1970 to 11.1% in 2021. This increase in FDI can be attributed to the region's growing middle class, large consumer market, competitive labour costs, and favourable investment policies. With ASEAN's economic resilience, further improvement of the business environment, and its effort to continue integrating the region's economy, ASEAN's FDI is projected to continue increasing.

ASEAN's growing influence as a middle-power bloc is evident from its crucial role in promoting stability, peace, and economic integration and cooperation. With its positive economic growth, large market, and increasing trade relevance both in the region and in the global level, ASEAN has attracted global attention. Several frameworks have also been worked on in ASEAN to actively participate in ensuring regional and global security, such as the ASEAN Economic Community (AEC), ASEAN Political-Security Community (APSC), and ASEAN Socio-Cultural Community. ASEAN, with is diverse cultural influence, could further promote cultural understanding, neutrality, and project the good values on the global stage. As a middle-power bloc, ASEAN could engage deeper in multilateral negotiations with other middle-power countries through strengthening its regional integration and keeping the international cooperation door open. ASEAN needs to actively engage and maintain its dialogue partnerships with countries and regional or international organizations.

13.4 ASEAN and the G20

13.4.1 The Role of ASEAN in the World Politically and Economically

ASEAN has been actively involved in enhancing international cooperation, promoting regional stability, and enhancing economic growth in the region. As a region, ASEAN has an approach to peace promotion which is based on consensus-building and non-interference. Its efforts in peace promotion have contributed to the region's stability and development. ASEAN leaders established the ASEAN Security Community Plan of Action that aims to achieve comprehensive security and commits to address the broad political, economic, social, and cultural aspects of building an ASEAN Community (ASEAN 2012). Through the ASEAN Security Community, it is expected that it would ensure the member states live at peace with one another and with the global world in a just, democratic, and harmonious environment. The Group of Twenty (G20) Bali Leaders' Declaration in 2022 states that it is essential to uphold international law and multilateralism that safeguards peace and stability while also acknowledging the vitality of having a peaceful resolution of conflicts (G20 2022). Over decades, ASEAN has been playing a significant role in the world, both politically and economically. The rising power of the emerging economies, including ASEAN, should not be underestimated, since globalization leads to interconnectedness and bilateral trade links with middle-power countries (Siddiqui 2021).

Politically, ASEAN has been serving as a platform for its member states to further discuss, cooperate, and collaborate on several issues, such as security, climate change, and human rights, both regionally and globally. ASEAN also has developed its community, the APSC, as an effort to integrate more its regional cooperation and development. With its APSC Blueprint, the community aims to envisage ASEAN's political and security cooperation to the higher stage, while also promoting political development in the region in adherence to the principles of democracy, the rule of law and good governance, respect for and promotion and protection of human rights and fundamental freedoms as written in the ASEAN Charter (ASEAN 2009).

Economically, ASEAN has proven to be a regional economic powerhouse, with a combined GDP of $3.6 billion in 2022 according to the EIU Database and a rapidly growing middle class with around 190 million middle-class population in 2020 (Park and Yeung 2021). Recently, the latest economic partnership of ASEAN and its main partners, the RCEP, serves as the biggest regional free trade agreement worldwide. This agreement is expected to have a significant impact on the global trading system and provide a major boost to it (Armstrong and Drysdale 2022). The RCEP united the free trade agreements of the 10 ASEAN member states with their major trading partners, including Australia, the PRC, Japan, the Republic of Korea, and New Zealand. The participation of the PRC, Japan, and the Republic of Korea, three of the largest economies in Asia, in this regional free trade agreement could reinforce ASEAN and East Asia's position as a new economic hub.

ASEAN's relevance, both politically and economically cannot be understated in any way. The ASEAN Economic Community (AEC) provides an example of ASEAN efforts to promote regional economic integration. The AEC provides crucial progress in step towards economic opportunities for ASEAN trade. Politically, ASEAN should actively promote inclusive regional cooperation, maintain peace and stability, and avoid conflicts in the region. Overall, ASEAN should uphold, maintain, and strengthen cooperation among its member states, while remaining united and central to achieve sustainable growth and prosperity.

13.4.2 The Role of ASEAN in the Robotics, Artificial Intelligence, and Digital Era

Various technological advancements have vastly revolutionized the production process of goods, business operation, how and what we trade, and how people live. Artificial intelligence (AI) advancement has increased the production and use of industrial robots that are capable of handling intricate tasks, while also being cost-effective (Ing and Grossman 2023). ASEAN has a huge opportunity to keep its main role in the digital era since its access to the internet in the region grows along the time, from 24.6 internet subscribers per 100 persons in 2021 to 79.5 persons per 100 persons in 2021. ASEAN also experienced a huge increase in its internet subscribers with a grand total of 460 million internet users in 2022 (Google, Temasek, and Bain & Company 2022).

The industrial robotics industry in ASEAN is anticipated to generate a revenue of approximately $700.4 million by 2023, based on regional projections (Statista 2022c). The International Federation of Robotics World Robotics Report 2022 shows that Thailand and Singapore are significant markets for robot installations in ASEAN. In 2021, Thailand saw a 36% increase in installations, with 3,914 units installed, while Singapore ranked as the seventh-largest Asian robot market despite a considerable decline in installations, with 3,467 units installed. Viet Nam, with 2,372 units installed, and Malaysia, with 1,929 units installed in 2021, are among the other emerging markets in ASEAN.

In terms of AI adoption, the region is currently still in the nascent phase of adoption. The AI investment in ASEAN is still very low, ASEAN companies allocated less than 0.5% of their revenue towards developing AI for their operations. When the US and the PRC reached the average number of $155 per capita and $21 per capita, respectively, in AI investment, ASEAN only received AI investment at an average of $2 per capita. Singapore recorded as the top country in AI investment among the ASEAN member states with $68 AI investment per person, while the other countries in the region invested less than $0.5 per capita in AI development (Kearney–EDBI 2020).

Despite the growth of ASEAN in the development and adoption of robots, AI, and digital technologies, ASEAN faces several digital transformation gaps, particularly in its internet speed, internet usage, and technology production. Moreover, ASEAN countries are also facing several challenges related to digital transformation: privacy, cyber security, and competition issues (Ing and Markus 2023). To promote the development of the digital environment in ASEAN, the organization has established multiple frameworks for digital planning, such as the ASEAN Comprehensive Recovery Framework features one of the latest documents on the ASEAN Digital Framework and the ASEAN Digital Ministers' Meeting endorsement of the Boracay Digital Declaration, which acknowledges digital inclusiveness in the region and seeks to enhance cooperation and collaboration among the AMS on digital matters while implementing sustainable plans. It is also important for ASEAN to work together towards the establishment of "ASEAN Digital Community 2045".

13.4.3 ASEAN and the G20

Given the growing role of developing countries in the global economy, ASEAN can develop further cooperation at the international level, particularly with the G20 to address the ongoing challenges and promote sustainable development and inclusive growth. At the multilateral level, ASEAN and the G20 can enhance their collaboration on several developing issues, such as trade facilitation, investment promotion, infrastructure development, and energy transition. Better cooperation can result in better economic integration between developed and developing countries, as well as enhance connectivity to attract investment to the region. In the case of growing digital technologies, ASEAN and the G20 can foster collaboration through knowledge sharing and joint initiatives to bridge the digital divide and promote the good kind of technologies and thrive the inclusive and sustainable digital development. Furthermore, engagement in political discussion and peace promotion issues need to be one of the fields of cooperation between ASEAN and G20. It is important for ASEAN and G20 to stay in a neutral position amid the growing geopolitical tensions and leverage multilateralism both in the region and in the global level.

13.5 Way Forward

ASEAN, as a rising region, has been actively engaged in the global world and shown its strong stance as the regional leader these past years. ASEAN also keeps promoting regional integration and enhances its economic cooperation with its main partners, such as the PRC, Japan, the Republic of Korea, Australia, New Zealand, and India. It shows ASEAN's commitment to take a key role in the global level. The aftermath of the prolonged COVID-19 pandemic has left the global community facing long term challenges towards recovery and growth. Widened geopolitical tensions increased pressures and challenges to the global economy.

The prolonged COVID-19 pandemic combined with rising geopolitical tensions have been worsening inequalities and overall people welfare. The increase in food and energy prices severely impacted the poorest people and rising income inequalities between the rich and the poor. The loss of 125 million full-time jobs in 2021 was equivalent to 99% of humanity's income decline during the COVID-19 pandemic. In addition, the pandemic has pushed 263 million people into extreme poverty in 2022.

Over the years, while the US has been the global leader in almost all key economic and politic areas, developing countries have been catching up. As the global economy keeps integrating, international trade and trade policies are becoming more important. ASEAN (particularly Indonesia) has emerged to be one of key players in the global economy, and thus it is important for ASEAN to take more active roles as well as responsibility in the global economy.

First, the G20 should cooperate with regional blocs across the globe to optimize their power to enhance the global world's economic growth and multilateral cooperation. At the same time, ASEAN needs to reinforce a consistent agenda on sustainable and inclusive global economic recovery. Second, the G20 needs to call for coherent multilateral cooperation and joint initiatives in several important fields, particularly on global peace promotion, the adoption of appropriate technology, energy transition, and climate change; and ASEAN needs to align itself with the global agenda. Last, considering the growing role of developing economies, the G20 should consider the role of emerging economies, including ASEAN, the African Union, and other emerging middle power countries and work together towards achieving global solutions for the world.

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CHAPTER 14

Governance and Complementarity of ASEAN and G20 Cooperation

Riatu Mariatul Qibthiyyah and Faradina Alifia Maizar

14.1 Introduction

Given the mounting global risk of a multi-faceted crisis, there is a need for improved working international cooperation of various international and regional forums. Reflecting on one performance of international and regional cooperation during the COVID-19 responses, the functioning and better coordination of the forums, as in the case of the Association of Southeast Asian Nations (ASEAN) and the Group of Twenty (G20), are needed to respond better to coordinated efforts in addressing global challenges, including support and improved regional cooperation.

Indonesia holds the ASEAN chair in 2023 and held the G20 presidency in 2022, which was taken over by India in 2023. This creates an opportunity to strengthen potential cooperation between the two forums. India has also cooperated with ASEAN, represented by the Framework Agreement on Comprehensive Economic Cooperation signed in 2003, the ASEAN–India Trade in Goods Agreement signed and entered into force on 1 January 2010, and the ASEAN–India Trade in Services Agreement signed in November 2014. Also, for 2023, Japan, a member of the G20 and the Group of Seven (G7) focuses on ASEAN and is a long-term partner country to ASEAN member states. In the Asia and Pacific region, the G20 leaders have convened four times since 2009: Seoul in 2010, Brisbane in 2014, the People's Republic of China in 2016, and Japan in 2019. Since Indonesia is the only member of Southeast Asia in the group, its hosting in 2022 to an extent laid a significant emphasis on the major difficulties facing developing regional economies, particularly those that are ASEAN members.

The 2023 G20's current troika is made up of the previous, current, and succeeding chairs—Indonesia, India, and Brazil. Indonesia is a founding member of the organization, while Brazil is an ASEAN sectoral dialogue partner. India's G20 presidency offers an invaluable opportunity for ASEAN member states to raise their concerns and priorities on the high table as the geo-economic and climate change-induced uncertainties that are obstacles to achieving a sustainable, prosperous, and inclusive future for the region.

From the above context, this chapter discusses the governance and structure of ASEAN and G20 cooperation, its role in the stakeholders' awareness, and the evolution of the priorities and issues initiatives from these two forums. The discussion in this chapter also aims to explore the challenges and the potential of cooperation between the G20 and ASEAN that may improve the effectiveness of their process and mitigate the limitation of their independent action.

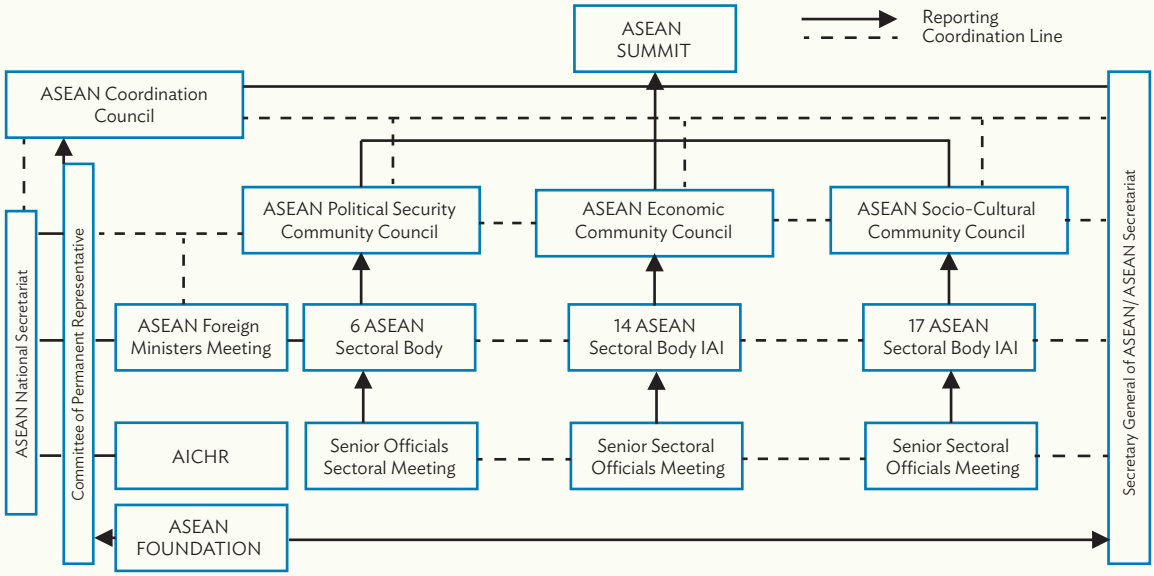
14.2 ASEAN Process and Its Structure: Role of the ASEAN Secretariat

ASEAN was established in 1967 when five leaders from Indonesia, Malaysia, the Philippines, Singapore, and Thailand signed the ASEAN Declaration. The document consisted of five articles outlining goals and objectives of ASEAN. These goals and objectives centered on cooperation in a variety of areas, including economic, social, cultural, technological, educational, and others, as well as the promotion

of regional peace and stability by steadfast commitment to the rules of justice, the rule of law, and the United Nations Charter. It said that all Southeast Asian countries that adhered to ASEAN's aims, values, and purposes were eligible to participate. As stated in the declaration, ASEAN stands for "the collective will of the nations of Southeast Asia to bind themselves together in friendship and cooperation and, through joint efforts and sacrifices, secure for their peoples and for posterity the blessings of peace, freedom and prosperity."

ASEAN has a binding institutional and legal framework for achieving previously agreed-upon objectives. Thanks to the ASEAN Charter, ASEAN has changed from a loose organization to one based on regulations. The ASEAN Secretariat is in charge of coordinating actions for regional integration, both between ASEAN member states and ASEAN and other stakeholders. The core mandate of the ASEAN Secretariat is to provide greater efficiency in coordinating ASEAN organs and for more effective implementation of ASEAN projects and activities.

Figure 14.1: Organizational Structure of ASEAN



AICHR = ASEAN Intergovernmental Commission on Human Rights.

Source: Wahyuningrum (2012) in Olsen, Teoh, and Miyazawa (2015).

The ASEAN Coordinating Council (ACC), comprising foreign ministers and convening at least twice a year, serves as a horizontal coordination body for the regional integration process. The ACC's duties are to: (i) coordinate the execution of agreements and decisions of the ASEAN Summit (the highest-level decision-making organ within ASEAN), and (ii) coordinate the ASEAN community councils to improve policy coherence, efficiency, and collaboration. The ASEAN community councils meet at least twice a year to review the implementation of decisions reached in the ASEAN summits and adopted by sectoral or ministerial bodies under their purview, coordinate issues that cut across pillars, and present recommendations to the

ASEAN Summit. These councils are presided over by the relevant minister from the member state currently in charge of the ASEAN Chair. Below the community councils, the appropriate sectoral or ministerial entities and their subsidiary supporting meetings or working group level provide recommendations to the councils on pertinent matters in accordance with their respective mandates, as depicted in Figure 14.1.

The Committee of Permanent Representatives (CPR), which collaborates with the ASEAN Secretariat and ASEAN sectoral ministerial bodies, also assists the community councils. The CPR is made up of ambassador-level representatives. The CPR communicates with the Secretary-General and the ASEAN Secretariat on all issues and everyday matters pertinent to ASEAN's activities. The CPR's facilitation and reinforcement of ASEAN collaboration with outside partners is one of its primary responsibilities.

The overarching *Roadmap for an ASEAN Community* (2009–2015), which consists of three community blueprints and the Initiative for ASEAN Integration (IAI) Work Plan (ASEAN 2009a, 2009b, 2009c), serves as a framework for the implementation of regional integration initiatives. Three categories best describing these activities are (i) national initiatives; (ii) regional activities that strengthen or supplement national initiatives through the sharing of knowledge, information, and experience; the creation of regional networks; and joint regional strategies (such as the creation of regional work programs); and (iii) regional activities that involve establishing regional standards or mechanisms.

The ASEAN Community Progress Monitoring System (ACPMS), which measures the progress of attaining ASEAN's primary goals for only the ASEAN Economic Community (AEC) and the ASEAN Socio-Cultural Community (ASCC), is a crucial system for monitoring and evaluating ASEAN activities. The ASEAN Economic Community Scorecard, which only evaluates compliance in implementing the specific measures and actions mentioned by the AEC Blueprint and not the progress in achieving the AEC's objectives, and the mid-term review of the ASCC are two monitoring and evaluation initiatives that the ACPMS is meant to complement. The ASEAN Coordinating Conference for the ASEAN Political-Security Community periodically reports to the ASEAN Political-Security Community Council (APSCC) on the status of its implementation.

14.3 G20 Governance on Government Working Groups and Engagement Groups

The G20 initially concentrated mostly on broad macroeconomic and financial sector issues. As a forum for the Finance Ministers and Central Bank Governors to discuss international economic and financial concerns, the G20 was established in 1999 following the Asian financial crisis. In the midst of the world financial and economic crisis of 2007, the G20 was elevated to the status of heads of state/government, and in 2009 it was designated the "premier forum for international economic cooperation." Annually, a G20 Summit is conducted with a rotating presidency in charge. The G20's agenda has now been expanded to cover topics including trade, sustainable development, health, agriculture, energy, environment, climate change, and anti-corruption.

The structure of the G20 has two components: the Sherpa Track and the Finance Track that consist of government working groups that can be classified across themes and/or priority issues set by the country holding the G20 presidency in that respective year. In general, to ensure continuity and as there is no permanent administrative structure, the host country can coordinate through a functioning troika approach, referring to the three countries of the previous year, the current year, and the next

year's presidency. The troika approach is endorsed, upholding the active involvement of the previous, current, and next year presidencies.

Given the nature of voluntary coordination in the G20, the arrangement of the working groups under the Sherpa Track and the Finance Track as well as the establishment of engagement groups is at the discretion of the country that holds the presidency. The host country also decides on the nonmember G20 countries that will be invited to the forum. Table 14.1 shows the structure of the G20 under India's presidency.

Other than the government working groups, the G20 forums have also incorporated engagement groups, which consist of stakeholders who are mostly nongovernment actors. The engagement groups are part of the G20 that give input and feedback to the G20 working groups and or leaders on both specific and general global problems issues. These engagement groups act independently and may issue their own communiqué ahead of the leaders› summit. To some extent, the involvement of the engagement group can provide alternate insight on global issues and interventions that are needed from the nonstate actors› perspectives. It can also function as a forum to discuss a more technical approach as well as even discuss contentious issues.

In addition to the member countries, the G20 presidency country can invite nonmember G20 countries and international organizations to the G20 forum. During its presidency, India invited the following nonmember countries: Bangladesh, Egypt, Mauritius, the Netherlands, Nigeria, Oman, Singapore, Spain, and the United Arab Emirates. In terms of international organizations, ASEAN is also invited to the G20 forum (G20 2023). To note, in the G20 member countries, Indonesia as a member country is also part of ASEAN and currently holds the ASEAN chair 2023, therefore, with the invitation of Singapore, there are two ASEAN member countries involved in the G20 forum in 2023.

Table 14.1: G20 Structure 2023: Government Working Groups and Engagement Groups

Sherpa Track	Finance Track
1. Agriculture Working Group 2. Anti-corruption Working Group 3. Culture Working Group 4. Development Working Group 5. Digital Economy Working Group 6. Disaster Risk Reduction Working Group 7. Education Working Group 8. Employment Working Group 9. Energy Transitions Working Group 10. Environment and Climate Sustainability Working Group 11. Health Working Group 12. Tourism Working Group 13. Trade and Investment Working Group	1. Framework Working Group 2. International Financial Architecture Working Group 3. Infrastructure Working Group 4. Sustainable Finance Working Group 5. Global Partnership for Financial Inclusion 6. Joint Finance and Health Task Force 7. International taxation Issues 8. Financial Sector Issues
11 Engagement Groups: Business20, Civil20, Labor20, Parliament20, Science20, SAI20, Startup20, Think20, Urban20, Women20, Youth20	

Source: G20 Background Brief (2023).

The challenges of the G20 are shown by a more diverse interest and the sprawling of issues of the perceived global problems and the national interest of each G20 member country. Despite that, the G20 addressed the issue of inclusion but at the same time increased the problem of lack of common values and priorities (Kirchner 2016; Fuess and Messner 2016). It is argued that the willingness of decision makers and nonstate actors to project an ever-growing list of topics onto the G20 agenda has

resulted in the creation of sometimes wordy communiqués (Kirchner 2016), questioning the practical effectiveness of the G20. Nonetheless, the G20 is still viewed as a tool for solving global issues; the meetings of the leaders, to some extent, may also provide multilateral and regional cooperation mandate to increase institutional capacity, legitimacy, and political capital.

Within the structure of the G20, and on cooperation between the Finance and Sherpa Tracks, on certain issues, the funding commitment to some extent has been initiated, as in the case of the global health pandemic preparedness fund, including the support of the new Special Drawing Rights of the International Monetary Fund. The development working group in the Sherpa Track has also functioned to coordinate the progress of the UN 2030 Agenda Sustainable Development Goals as the G20, to some extent, also functions as a forum of mutual learning among its members (Fuess and Messner 2016).

The monitoring aspect of the G20 initiative does not embed in the G20 structure as the type of initiatives within the G20 is relatively nonbinding. The monitoring effort is conducted not as a formal unit in the G20 but mostly on the initiative of some of its stakeholders. For example, there is a G20 research group from the University of Toronto that is stocktaking the initiatives stated in the leaders' communiqués and other documents, as in the case of ministries' meetings deliverables, or the G20 insights from the Global Solutions Initiatives that compiled the Think20 engagement group policy briefs. To some extent, there are also various monitoring activities within each working group, for certain initiatives that have been promoted.

Meanwhile, in the context of ASEAN, ASEAN members embrace consultation and consensus as guiding concepts in its operations due to their incredibly diverse national origins. The principle, which is formally established in Article 20 of the ASEAN Charter, guarantees equality among member states and prevents any member from being marginalized in important decisions. Furthermore, because many nations in the region have a history of having a democratic deficit, they are often wary of outside meddling in their domestic affairs. As a result, they are able to operate regionally due to the consensus concept without worrying about compromising their local political interests.

Despite helping the ASEAN member states to maintain unity and give members a sense of security over their membership in ASEAN, the consensus concept reduces the ASEAN›s ability to act effectively on several security matters.[1] After the number of member states increased from five to ten,[2] it appeared that the difficulties of finding consensus within ASEAN had grown significantly. Finding a commonality among the member states becomes more difficult as the membership grows as national interests sometimes diverge (Hiep 2016).

Unlike the G20, in which there are engagement groups as part of the structure, ASEAN does not involve nonstate actors in its process. It is limited to the ASEAN Business Advisory Council and the ASEAN Inter-Parliamentary Assembly. There is an ASEAN Foundation, managed by the ASEAN Secretariat, but its function is limited to conveying interest and awareness of ASEAN's existing initiatives, especially for the young cohort, as it aims to improve within ASEAN people-to-people mobility. A relatively dominant government-led process, ASEAN still pose challenges to be relatively inclusive in its process and thus can be perceived as relevant by their own societies.

[1] For instance, ASEAN was viewed to fail to coordinate a coordinated response to the United States' 9/11 terrorist attacks and the ensuing US-led war on terror, particularly in the Middle East (Hiep 2016).

[2] Timor Leste is expected to be the 11th member of ASEAN.

14.4 Public Awareness of ASEAN and G20 Issues in ASEAN and G20 Countries

An engaged public discussion on issues related to ASEAN and or the G20 in this context can be viewed from Google Search Index on that related topic in ASEAN member states. Figure 14.2 shows the Google news search index composition among ASEAN member states on the topic of ASEAN in comparison to the G20 topics. As shown in Figure 14.2, news coverage of the G20 in 2022, during which Indonesia held the presidency, not only occurred in Indonesia. Although only Indonesia and Singapore are involved in the G20 forum, the attention and news coverage of the G20 was also quite high in other ASEAN countries. For example, the news search index of the G20 is much higher in Thailand in comparison to Singapore.

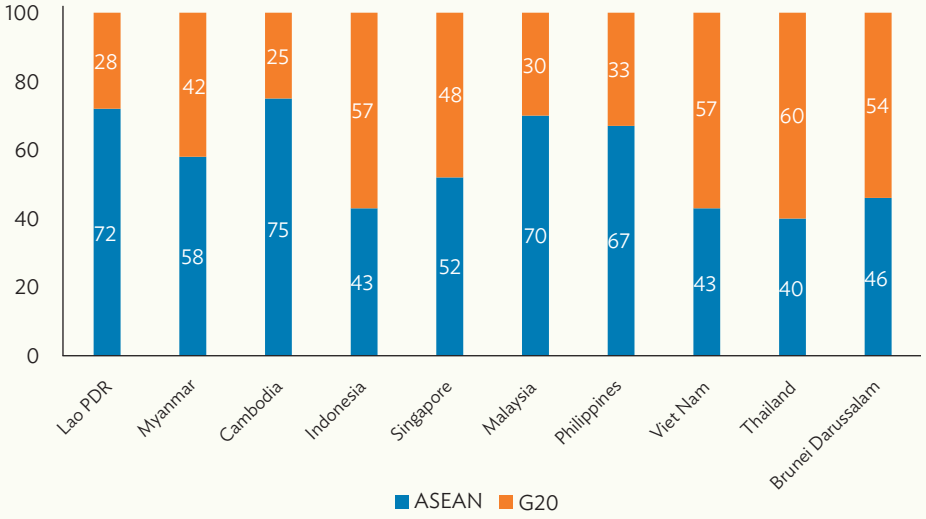
Compared to ASEAN news issues, the public interest in news of the G20 has been visible as well in some ASEAN countries. Other than Indonesia, ASEAN countries such as Thailand, Viet Nam, and Brunei Darussalam, which are non G20 members have a news search index of the G20 topic in terms of its composition that is larger than the ASEAN topic. As for Indonesia, during 2022, even as the country held the G20 presidency, the news coverage on ASEAN was also visible as the share of the news search coverage in Google search is 45% for ASEAN and 55% for the G20. The interest in the G20 topic in 2022 for ASEAN member states has increased in comparison to previous years, and for the case of Indonesia, the G20 member, the Google news search index shows that the G20 is still rarely addressed and covered extensively in national news prior to 2022.

On overall worldwide interest, Google web searches for the G20 and ASEAN can be viewed in Figure 14.3. There is a relatively high web search index on both themes during 2023, as shown in Figure 14.3. A relatively high web search index on ASEAN implies that interest in ASEAN does not only come from ASEAN member states but also from non-ASEAN countries. As also shown in Figure 14.3, the Google search index on ASEAN, globally, is not much different from the Google search index on the G20 topic, referring to 2023.

To some extent, it is also plausible that the coverage of the issue that is relatively broader in the G20 may as well link to ASEAN issue priorities. Indonesia, which holds the ASEAN chair in 2023 and has previously hosted the G20 forums potentially tries to link the priorities and coordination of the initiatives between these two forums. The public interest and news coverage peaked during the summit and the inception of this 1-year presidency. In the case of the G20 in 2023, the peak of the news search is in early March and May, which refers to respectively the consecutive ministry-level forums as in the case of finance and foreign ministries meeting and the several back-to-back working group meetings. In the case of ASEAN, the peak of the Google web search index is also in May when the Labuan Bajo ASEAN first leaders' summit was held.

As both ASEAN and the G20 consist of several convening high-level forums, with ministry-level meetings up to the leaders' summit, the web search is plausibly driven by news coverage as well. The various activities of these two forums, in the context of host countries, are generally part of showcasing tourism and or specific cities' development.

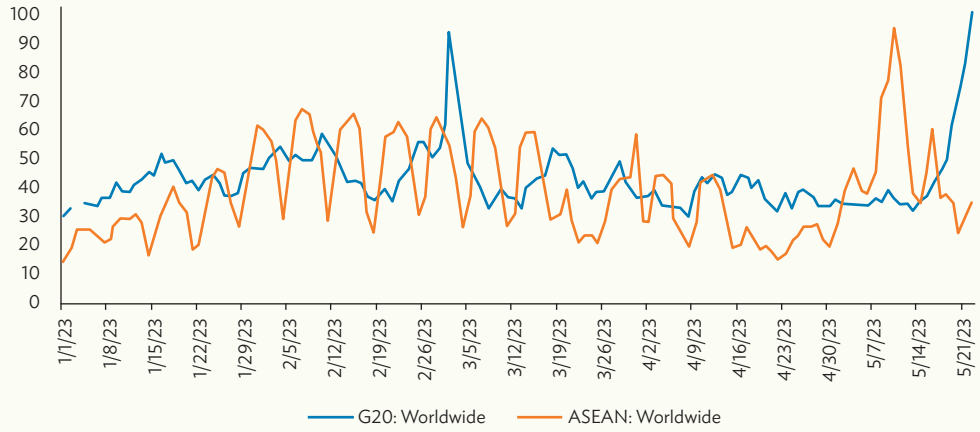
Figure 14.2: Google Search News Index on ASEAN and G20 in ASEAN Member States in 2022 (%)



Note: The percentage is the share of 52 weeks of the Google Search News Index for the search terms "ASEAN" and "G20" for each country.

Source: Authors' compilation from the GoogleTrends.

Figure 14.3: Worldwide Google Web Search Index on ASEAN and G20 in 2023



Source: Authors' compilation from the Google search index.

14.4.1 Priorities of ASEAN and G20: Similarities and Differences

Figure 14.4 and Figure 14.5, respectively, show the priorities of ASEAN under Indonesia's chair and the G20 priorities during India's presidency. The current theme of the ASEAN chair under Indonesia is "ASEAN Matters", which covers (i) strengthening of ASEAN capacity and effectiveness, (ii) ASEAN unity, and (3) ASEAN centrality.

The epicenter of growth is related to ASEAN's role as the center of regional and world economic growth that puts priorities on health architecture; energy security; food security; and financial stability, some of which are also aligned with the G20 discussions that evolved on broad development issues. The G20 under India's presidency put 13 themes of discussion, mostly cross-cutting multi-sector themes tending toward general initiatives related to development and its financing.

The ASEAN leaders committed to formalize their previously ad hoc collaboration by creating an ASEAN Community by 2020: in 2007 the target date was pushed back to 2015. As a means of achieving this objective, ASEAN approved a charter in 2007 along with the phrase "One Vision, One Identity, One Community." ASEAN then released a roadmap in 2009 that included detailed plans for actions in each of the three pillars of the community. The roadmap was modified in 2015 and now extends through 2025 as work on creating the community is still in progress.

While having ambitious objectives set forth in the 2007 ASEAN Charter, they are not supported by any methods of implementation (Russel 2020). The organization lacks both major funding and legal authority. As has been discussed before, the ASEAN Secretariat does not represent the interests of the community before the member nations. Rather, it offers administrative support for intergovernmental cooperation. ASEAN does not pass legislation that is enforceable by its members; instead, they implement and uphold common decisions as they see proper.

There has been uneven progress among the three pillars. On the political security pillar, the most notable achievement of ASEAN is promoting peaceful cooperation that brings stability to a once unstable region. Two years prior to the signing of the Bangkok Declaration in 1967, there was unrest between Indonesia and Malaysia in Kalimantan. ASEAN has also contributed to reducing tensions, although not all, in territorial and maritime issues. Led by Indonesia, ASEAN settled a 2008 border dispute between Thailand and Cambodia. Although not a military alliance, the annual ASEAN Defence Ministers' Meetings (ADDM) with counterparts including Australia, the People's Republic of China (PRC), India, Japan, New Zealand, the Republic of Korea, the Russian Federation, and the United States (US) (ADDM+), serve as an effective communication channel and has had helpful outcomes, such as enabling the exchange of information about terrorists (Russel 2020).

Today, ASEAN is expected to take a role in resolving the Myanmar issue. Myanmar will become a defining crisis for the region due to the individual ASEAN countries' divergent stances and the lack of progress in implementing the Five Point Consensus (5PC), a guiding document agreed upon by ASEAN leaders to solve the crisis in Myanmar. Meanwhile, the global community will be closely watching how ASEAN continues to respond to the Ukraine war and to the intensifying US–PRC rivalry. To a lesser degree, G20 member countries have divergent approaches in responding to the geopolitical crisis, as in the case of the war in Ukraine, where the Russian Federation is currently a member of the G20.

Moving to the economic pillar, as part of its 2009 plan, ASEAN aimed to establish an ASEAN economic community (AEC). This is to be built on the free movement of goods, services, capital, and people. The AEC is still a work in progress even though the 2015 deadline has long since gone. Related to these longer-term initiatives, ASEAN member states are also expected to have a consensus on the ASEAN

vision post-2025. In this case, Indonesia also aims that under its chair, the forum can also set ASEAN Vision 2045.

Tariffs have seen some of the largest advancements. The majority of tariffs between ASEAN nations were abolished or lowered before 1992, thanks to the ASEAN Free Trade Area. The AEC gradually eliminated most of the remaining barriers, and by 2017, 70% of intra-ASEAN commerce was duty-free (UNESCAP 2017). As a result of free trade agreements reached with the PRC, India, Japan, the Republic of Korea, Australia, and New Zealand, ASEAN has also liberalized commerce with the larger Asia and Pacific region. Five of these nations will be a part of the regional comprehensive economic partnership, which is on the verge of becoming the largest free trade area in the world. Contrarily, despite the efforts of the ASEAN nations to harmonize technical requirements and customs practices, a sizable number of nontariff trade barriers still exist and may perhaps be increasing (Lohatepanont 2019).

The transport and other connecting infrastructure that Southeast Asian nations need are also lacking, a gap that the PRC is eager to overcome by making significant investments in this industry through its Belt and Road Initiative. Additionally, the ASEAN Infrastructure Fund has authorized $500 million in loans since 2011 (ADB 2019), but this is far from the $100 billion a year the region needs to establish seamless connections (Larkin 2015).

Lastly, with regard to the socio-cultural pillar, which covers policy areas including environmental protection, education, culture, and human rights, Russel (2020) found that progress in these areas is not as impressive as the other two pillars due to lack of specific objectives, binding measures, and funding. The 2002 Agreement on Transboundary Haze Pollution, one of ASEAN's few environmental measures, aims to reduce the persistent issue of smoke from Indonesian forest fires, which disrupts economies and causes premature deaths in Indonesia and surrounding nations. 2015 was one of the worst years ever (Jenkins 2015), the agreement has not produced more than a few sporadic acts (Feng 2013) or noticeable improvements. The region's reaction to climate change is also largely influenced by national initiatives.

According to Freedom House Index 2023 ranking, Brunei Darussalam, the Lao PDR, Viet Nam, Cambodia, and Myanmar have low scores on the global freedom index, with low scores on political rights and civil liberties, suggesting that human rights are an area of particular vulnerability for ASEAN. Southeast Asian nations avoid public criticism, even of flagrant violations of human rights, in accordance with the ASEAN principle of noninterference in internal affairs. One of the rare exceptions to this rule occurred in 2017 when then-Malaysian Prime Minister Najib Razak criticized Myanmar's treatment of the Rohingya minority.

In contrast to ASEAN that is based on long-term roadmaps and framework of cooperation, the context of the G20 and the priorities that have been set are more as an immediate action and aim to have been followed up by multilateral and or regional cooperation that fits with the mandate. This is given the nature of the G20 establishment, to be an effective forum for coordination on handling the global financial crisis at the time. However, over the years, the topics covered by the G20 have dispersed from finance and economic policies to development and environmental issues. The evolution of the G20, which also consist of priorities on development and sustainability issues, implies that the G20 is partially shifted to also focus on long-term global problems.

The G20 presidency under India promotes themes of "One Earth, One Family, One Future." It covers a wide range of topics such as inclusive, equitable, and sustainable growth, the context of LIFE—lifestyle for environment, women empowerment, digital infrastructure, climate financing, disaster risk reduction, development cooperation, as well as multilateral reforms. These topics are the basis of the discussion in respective working groups and or engagement groups.

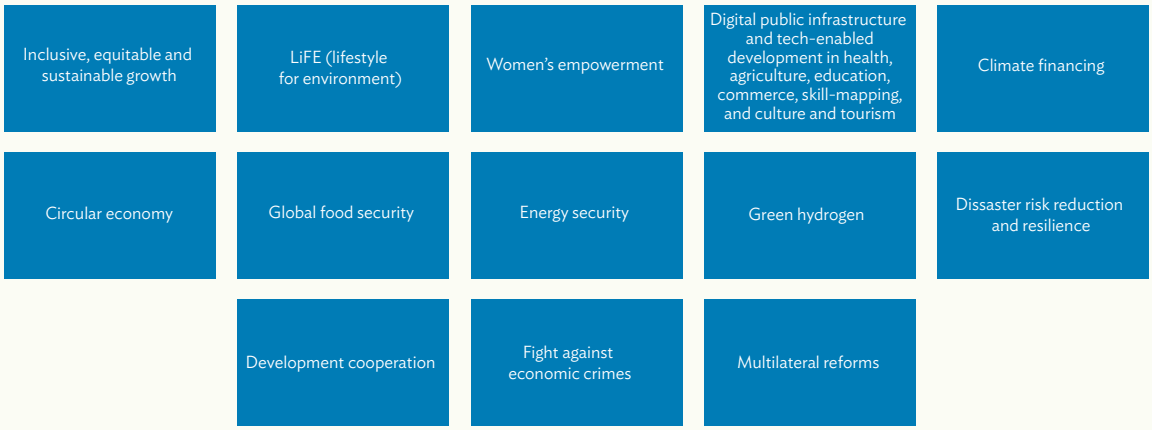
One of the main challenges of the G20 is handling the sprawling structure and activities conducted, as well as the issues discussed. Despite the fact that the problems are known, there is not much effort to simplify and focus on specific issues. For the structure of the G20, it also needs stronger coordination between the Sherpa and Finance Tracks to have more effective initiatives. As an example, the response of the G20 to the crisis of the COVID-19 pandemic, which is a multi-dimensional crisis, requires instrument and coordination not only in terms of economic policies but also in the sectoral, as in the case of policies on health, as well as in the context of tackling food insecurity due to the risks of economic slowing down and as global recovery hampered by geopolitical tension and the increasing trade barriers.

Figure 14.4: Priority Areas and Priority Economic Deliverables of Indonesia's 2023 ASEAN Chair

Rebuilding Regional Growth, Connectivity, and New Competitiveness (recovery rebuilding)	Accelerating Inclusive Digital Economy Transformation and Participation (digital economy)	Promoting Sustainability Economic Growth for a Resilient Future (sustainability)
• ASEAN Services Facilitation Framework • Fostering recovery and ensuring economic financial stability and resilience • ASEAN Leaders' Declaration on Strengthening Food Security • Signing of the 2nd protocol amends the Agreement to Establish the ASEAN-Australia-New Zealand Free Trade Area • Establishment of the Regional Comprehensive Economic Partnership (RCEP) Support Unit at the ASEAN Secretariat, Jakarta, Indonesia • ASEAN Framework for industrial project-based initiatives (cross-pillar initiatives)	• Full implementation of e-Form D through the ASEAN Single Window • Advance payment connectivity and promote digital financial literacy and inclusion to support inclusive economic growth Statement of the Leaders to develop the ASEAN Digital Economy Framework Agreement (DEFA) • Regulatory Pilot Space (RPS) to facilitate cross-border digital data flow to enable self-driving cars in ASEAN • ASEAN Framework on Logistics for Digital Economy Supply Chains for Rural Areas (Last-Mile Delivery)	• ASEAN Standards Harmonization Roadmap to support the implementation of the Sustainable Development Goals (SDGs) • Development of the electric vehicle ecosystem • Development of the ASEAN Blue Economy Framework (cross-pillar initiative). • Transitional Finance Framework to support sustainable finance and a green economy • Declaration of Sustainable Energy Security through interconnectivity and market integration

Source: Coordinating Ministry for Economic Affairs (2023). https://www.ekon.go.id/publikasi/detail/4873/focusing-on-strengthening-a-fast-growing-inclusive-and-sustainable-regional-economy-indonesia-runs-the-2023-asean-chairmanship and https://ekonomi.bisnis.com/read/20230116/9/1618716/ini-16-agenda-prioritas-indonesia-dalam-keketuaan-asean-2023

Figure 14.5: Priorities of India's G20 Presidency



Source: D'Souza, Jain, and John (2022).

14.4.2 Potentials of G20 and ASEAN Cooperation

As the troika is designed to extend seamless continuity to the G20 agenda, with Indonesia as the previous G20 presidency and India's G20 presidency in 2023, it provides an invaluable window for ASEAN member states to put their concerns and priorities on the table as the geo-economic and climate change-induced uncertainties, which are hurdles to achieving a sustainable, prosperous, and inclusive future for the region. Given that the G20 forum is also perceived as a premier forum of international cooperation, ASEAN can also exercise connecting the initiatives of the regional cooperation for the case of mutual learning and or funding scheme accessibility.

A regional cooperation forum, ASEAN is relatively open and seeks cooperation with other non-ASEAN countries as well. In terms of initiatives, ASEAN has established cooperation with various countries, ranging from areas of trade to broader economic cooperation. Currently, ASEAN has set up dialogue partnerships with 11 countries, 10 of which are a G20 member. ASEAN also has sectoral partnerships with six countries and has development partnerships with four countries, some of them G20 member countries. As most of the G20 countries have cooperation partnerships with ASEAN, creating a linkage between the G20 and ASEAN may strengthen the existing cooperation that has been formed. At the same time, the participation of the ASEAN chair at the G20 Summit and other G20-related meetings will help to convey ASEAN views on the G20 agenda as well as global and regional issues. The ASEAN G20 Contact Group, which was founded in 2009, has proven to be a beneficial tool for coordinating ASEAN's agenda-related positions and objectives (Byrne 2022). And with the significant exception of 2019, the ASEAN chair has regularly attended the G20 summit as an invited guest. The fact that Indonesia hosted the G20 in 2022 demonstrates that ASEAN's constructive diplomacy inside the global economic steering committee has been successful. Additionally, Indonesia is in a position to ensure a prolonged regional impact given its role of ASEAN's presidency in 2023 after serving as the G20 president in 2022.

To reach a common goal, for example achieving the Sustainable Development Goals (SDGs), the G20 and ASEAN should build strong leadership and collaboration. If the G20 is to allocate technical assistance for ASEAN, there are two funding mechanisms within ASEAN that would make this work. First, the ASEAN Partners' Trust Funds where external partners like the G20 provide funds to the ASEAN Secretariat and the ASEAN Secretariat manages the funds. Through this mechanism, projects can be initiated by the ASEAN member states and external partners, based on agreed priorities. Then, funds are disbursed by the ASEAN Secretariat to the implementing agency of the approved project. Guidelines and procedures of the ASEAN Project Management Framework (PMF) are applied for this mechanism. The second mechanism is the ASEAN Partners' Fund where funds are provided and managed by an external partner. For this mechanism, single project proposals or activities are defined by the program document or annual work plan. The external partner manages the funds and in some cases, contracts a technical assistance team to implement the program. The technical assistance team reports to a steering committee composed of ASEAN and the external partner. Only main elements of the guidelines and procedures of the ASEAN PMF are applied.

As ASEAN currently set its vision of 2045, it may need to reflect on cooperation that can work and be scaled up. For example, in the case of trade openness and structural reform, improving the regulatory and investment climate within the area is feasible to improve foreign direct investment and ASEAN member state participation in global value chains. The limited foreign direct investment, especially among the least-developed countries in ASEAN, is still an issue to improve industrialization within ASEAN (Pushp and Ahmed 2023). ASEAN may coordinate with other fora as in the case of the G20 on the areas that are still lacking progress, as in the case of environmental protection.

There might be different pressing problems dealt by each member state, on environmental-related issues, and to some extent, policy intervention need not always be adopted in a similar degree across ASEAN countries. For example, in terms of greenhouse gas (GHG) emissions, at least five countries in ASEAN—Indonesia, Malaysia, Viet Nam, Thailand, and the Philippines—should step-up efforts on mitigating emissions, given their high share of GHG emissions in comparison to other ASEAN countries. Chien et al. (2023) show that trade openness and financial sector development for the case of ASEAN countries align with the reduction of GHG emissions in both the short and long term, indicating the potential of supporting a green agenda within the current framework of trade and economic cooperation.

In terms of ASEAN governance, the permanent administration makes it plausible to consistently track the progress of the initiatives, though it has not yet ensured this type of organization is relatively efficient in terms of following up on the initiatives. The state of the ASEAN survey in 2023 shows how the stakeholders perceived ASEAN as slow and ineffective in coping with the dynamic of geopolitical and global economic conditions (Seah et al. 2023).

Despite a permanent secretariat that can handle and follow through on ASEAN initiatives, including the presence of a monitoring and evaluation unit within its organization, to some extent, there is limited authority of the secretariat on how to address each compliance issue with ASEAN mandates and or its initiatives. Even in the context of economic cooperation, a fulfillment of a standard or an agreed reform can stall as it depends on the voluntary aspect in terms of the pace and coverage of reform that each member state is willing to adopt.

14.5 Conclusion

Despite criticism of ASEAN for its ineffectiveness in following up on its initiatives, various countries seek cooperation with ASEAN, and it is also involved in multilateral forums, as in the case of the G20. The longer-term initiatives of the G20 can be aligned with the mandate that is relatively similar in the ASEAN context and vice versa. On issues that ASEAN is still unable to solve, such as environmental protection or human rights, it could cooperate with other regional and or multilateral organizations to seek better approaches in tackling the issues.

The public attention within ASEAN member countries and globally on ASEAN-related issues is high, indicating the relevance of ASEAN partly contributed by the openness of ASEAN cooperation with nonmember ASEAN countries. Given this context, ASEAN can take advantage of its openness to complement its initiatives, including involving not only governments but also nonstate actors. This year, under Indonesia's chair, ASEAN Leaders have agreed to develop ASEAN Community's Post 2025 to realize an inclusive, participatory, and collaborative Community that is no longer divided by the development gaps among its members.

The ASEAN Secretariat needs to strengthen its monitoring and evaluation unit and provide a transparent assessment of the member countries' compliance of the ASEAN initiatives. It also needs to exercise types of project management cooperation to optimize existing funding arrangements supported by ASEAN partner countries, some of which are G20 member countries. Specifically for Indonesia that holds G20 and ASEAN membership, it can utilize the G20 Contact Group to better advance ASEAN and G20 common initiatives.

There is no one-size-fits-all on types of multilateral and regional cooperation that can cater to the needs of global cooperation. ASEAN, which was formed 55 years ago, is overdue for its vision of facilitating ASEAN connectivity in supporting growth and promoting policies that can improve the quality of economic recovery, social progress, and maintain peace and security in the region.

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Transforming ASEAN
Strategies for Achieving Sustainable and Inclusive Growth

Transforming ASEAN: Strategies for Achieving Inclusive and Sustainable Growth examines the key opportunities and challenges facing the Association of Southeast Asian Nations (ASEAN) region as it transitions toward a more sustainable and low-carbon economy while greater integration and global recognition. This book was initiated by the Asian Development Bank Institute and the Ministry of Finance of Indonesia in 2023 during Indonesia's ASEAN chairmanship and builds on the momentum of Indonesia's successful G20 presidency.

The book brings together more than 20 contributors from the ASEAN region and beyond to discuss pathways for ASEAN's sustainable transformation. It is divided into three parts, each focusing on crucial aspects of current transitions. Part I examines the dynamics of Southeast Asia's low-carbon economy, exploring strategies to reduce carbon emissions and foster environmentally friendly practices. Part II examines the importance of investing in a new sustainable economy, highlighting the potential for ASEAN regional economic integration, green growth, scientific innovation, and new business models. Finally, Part III explores the ways in which ASEAN can contribute to multilateral cooperation, emphasizing the significance of collaborative efforts on a regional and global scale, such as through the G20.

With policy recommendations and case studies, the book aims to support and offer timely insights and robust policy guidance to governments, policy makers, financial institutions, and stakeholders in the pursuit of climate commitments and the Sustainable Development Goals. It underscores the need for collaboration and investment in knowledge-building and sharing among public and private stakeholders to effectively address the complex challenges of achieving inclusive and sustainable growth in ASEAN.

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