THE GREATER MEKONG SUBREGION
INNOVATION STRATEGY FOR DEVELOPMENT 2030

DECEMBER 2025

ADB

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Abbreviations

ADB	Asian Development Bank
AI	artificial intelligence
PRC	People's Republic of China
CSA	climate-smart agriculture
COVID-19	coronavirus disease
FDI	foreign direct investment
GMS	Greater Mekong Subregion
GMS-2030	Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030
GMS ISD	Greater Mekong Subregion Innovation Strategy for Development
ICT	information and communication technology
Lao PDR	Lao People's Democratic Republic
NIS	national innovation system
OECD	Organisation for Economic Co-operation and Development
SEZ	special economic zone
SMEs	small and medium-sized enterprises
STI	science, technology, and innovation

Executive Summary

In December 2023, the Greater Mekong Subregion (GMS) ministers agreed to develop an innovation strategy for the subregion. The GMS Innovation Strategy for Development 2030 (GMS ISD) is primarily targeted at accelerating progress toward achieving the ambitions of the Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030 (GMS-2030), which was itself adopted at the 7th GMS Summit of Leaders in 2021.

Innovation is a broad term capturing the creation and application of new knowledge, technology, and ways of doing things, as well as incremental innovation that involves learning and the acquisition, adaptation, and adoption of existing knowledge by actors positioned away from the global technological frontier.

Innovation offers countries the possibility of improved economic outcomes and livelihoods, the achievement of societal objectives, and solutions to global and regional challenges. By driving human progress, innovation is the leading driver of long-run economic growth and industrial development. Innovation is also a complex and uncertain activity that takes place within a broad system of actors. For it to flourish, the capabilities of the different actors need to be built and local and cross-border links between them established.

The GMS ISD will assist in developing the GMS subregional innovation system, helping in identifying ways of enhancing cross-border collaboration and cooperation to maximize the potential and efficiency of innovation in solving regional challenges.

The GMS ISD will support the development of the national innovation systems and address weaknesses of the current subregional innovation system by:

- providing a focus and direction for innovation in the subregion;
- facilitating policy dialogue and knowledge exchange among policymakers;
- building the skills and capabilities of different innovation stakeholders;
- strengthening networks between different innovation actors across the subregion;
- encouraging the diffusion of knowledge and technology across GMS borders;
- enhancing opportunities for cross-border innovative activities; and
- establishing a robust monitoring and evaluation mechanism.

The GMS ISD will focus on three strategic approaches to developing the subregional innovation system.

Strategic Approach 1: Digitalization. The ongoing global trend toward digitalization offers the possibility of improved economic growth, productivity, and competitiveness. It also needs to be managed carefully to avoid creating digital divides, widespread unemployment, and rising inequality.

With a young, dynamic, and technology-aware population, the GMS has the potential to embrace digitalization and manage disruptions. The GMS ISD will help speed progress toward the adoption of digital technologies and the building of digital infrastructure in the subregion. It will do this by supporting the development of cross-border digital connectivity and infrastructure; encouraging the development of cross-border digital platforms; facilitating discussion and knowledge sharing on legal, regulatory, and governance frameworks; and building capabilities for digital entrepreneurship.

Strategic Approach 2: The Green Transition. The GMS is vulnerable to climate-related risks and disasters, and suffers from air, land, and water pollution. These represent a substantial risk for the GMS, impacting on human health and economic

activity across a range of sectors. GMS countries have varying levels of capacity to reduce and manage these risks.

The GMS ISD will encourage collaborative and innovative approaches to encourage a shift toward economically sustainable growth. Initiatives under the GMS ISD include promoting efforts to diffuse and adopt green technologies; supporting the adoption of low-carbon and climate-resilient infrastructure; developing green cluster initiatives to develop links between green innovation actors; encouraging dialogue on regulatory frameworks for climate-resilient infrastructure; and building the skills to promote sustainable transitions.

Strategic Approach 3: Connectivity. Connectivity has been an important component of the GMS Program since its inception. In addition to generating competitiveness, employment creation, and economic diversification, improved connectivity facilitates trade and investment, which are important sources of knowledge and technology in the digital and green realm, as in others.

The GMS ISD will promote the development of innovative connectivity solutions and improve connectivity to boost innovation performance. This will involve developing GMS economic corridors to connect cities, ports, special economic zones, and other economic production centers; facilitating knowledge sharing on models for last-mile energy connectivity; building cross-border networks to enhance capability building and exchange; and promoting dialogue on regulatory alignment to enhance different forms of connectivity.

Across these three strategic approaches, initiatives will further target a set of cross-cutting areas crucial for the development of an improved and inclusive subregional innovation system.

Knowledge and Technology Diffusion. Through infrastructure development, the enhancement of trade and investment, and building cross-border networks, the GMS ISD will facilitate the diffusion of knowledge and technology.

Human Capital and Skills Development. Through capacity building and cross-border exchange, the GMS ISD will help improve individual creativity, knowledge, and skills to help foster a culture of innovation.

Start-Ups and Small and Medium-Sized Enterprises. By easing the burdens of innovation for start-ups and supporting intermediary organizations tasked with encouraging innovation, the GMS ISD will facilitate innovation in small and medium-sized enterprises (SMEs).

Inclusivity. Through targeted efforts, the GMS ISD will encourage inclusivity in the innovation process, ensuring that innovation is targeted at addressing the challenges facing society, including disadvantaged groups.

The different activities under the GMS ISD will be implemented largely through the GMS sector working groups, with the GMS ISD closely aligned with the strategies of the GMS priority sectors. These efforts will be supported by several initiatives.

GMS Task Force on Innovation. The Task Force on Innovation will work closely with sector working groups, providing direction for the GMS ISD, identifying priorities, and monitoring and reporting on progress.

Innovation Forums. To facilitate knowledge sharing and learning on innovation and innovation policy, the GMS Program will organize regular GMS innovation forums.

Capacity Building. To build the capabilities of policymakers and implementing agencies in devising and implementing innovation policies, the GMS Program will develop and administer capacity-building programs.

GMS Innovation Fund. A GMS innovation fund will be created to finance the activities under the GMS ISD, with the GMS Program supporting efforts to identify funding mechanisms to support start-ups and SMEs in their innovation activities.

Partnerships and Private Sector Collaboration. The GMS ISD will help build partnerships between different stakeholders across the GMS to facilitate innovation.

Policy and Regulatory Framework. The GMS Program will convene policymakers from across the subregion to simplify and harmonize the regulatory landscape to encourage innovation.

Monitoring and Evaluation. A monitoring and evaluation framework will be developed to measure progress toward the ambitions of the GMS ISD.

Data Collection and Harmonization. The GMS Program will support discussions on the development of common frameworks for the collection of innovation data across the GMS.

The GMS Innovation Strategy for Development 2030 leverages innovation to support sustainable growth, connectivity, and well-being through inclusive regional collaboration, with emphasis on digitalization, green transition, and value chain integration.

1

Introduction

Defining Innovation. The creation and application of new knowledge, technology, and methods, alongside incremental innovation that involves acquisition, adaptation, and adoption of existing ideas (photo by Shutterstock).

During the coronavirus disease (COVID-19) pandemic, a new Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030 (GMS-2030) was endorsed and adopted at the 7th GMS Summit of Leaders in 2021. GMS-2030 provides a holistic response to existing and new challenges and considers both medium-term priorities and long-term regional challenges.

To achieve the GMS Program's vision of a more integrated, prosperous, sustainable, and inclusive subregion, GMS-2030 seeks increased cooperation to develop:

Community. Enhancing cooperation to address shared social and environmental concerns, particularly those regarding communicable diseases, environmental sustainability, and the building of climate change resilience.

Connectivity. Improving connectivity in the subregion through sustainable energy and transport, physical infrastructure, and the transformation of transport corridors into transnational economic corridors.

Competitiveness. Promoting trade and investment facilitation; building an open and nondiscriminatory business environment; and integrating markets, production processes, and value chains in a climate-friendly manner.

GMS-2030 also identifies a set of long-term regional challenges for the GMS countries that would be more efficiently tackled through regional cooperation:

(i) the risk of pandemics;

(ii) weaker global growth and threats to free trade;

Community. COVID-19 vaccination campaign in 2021 in Phnom Penh, Cambodia. The GMS seeks to strengthen cooperation to address shared environmental and social concerns, including the spread of communicable diseases.

(iii) persistent pockets of poverty and increasing in-country inequality;

(iv) severe environmental challenges and threats from climate change, disaster events, and pollution;

(v) technological change and digitalization;

(vi) evolving demographics; and

(vii) rapid urbanization.

After 3 years of implementing GMS-2030, there is an urgent need to accelerate progress. In December 2023, GMS ministers agreed to develop an innovation strategy for the subregion. This GMS Innovation Strategy for Development (GMS ISD) aims to expedite progress by placing innovation at the center of efforts to meet the ambitions of GMS-2030.

Innovation is a broad term that captures the creation and application of new knowledge, technology, and ways of doing things, but also incremental innovation that involves learning and the acquisition, adaptation, and adoption of existing knowledge by actors positioned away from the global technological frontier. Innovation includes the application of new approaches in policy development, institutions, organizations, and public services.

> **GMS Program Vision: A more integrated, prosperous, sustainable, and inclusive subregion.**

Innovation has the potential to improve economic outcomes and livelihoods, achieve societal objectives, and help solve global and regional challenges. Innovation is the leading driver of long-run economic growth and industrial development, driving human progress most recently through advances in information and communication technology (ICT) and digital technologies, including advanced robotics and artificial intelligence (AI); renewable energy technologies that are shifting production away from fossil fuels and mitigating climate change through carbon capture; and health technologies, such as the development of vaccinations for COVID-19. Innovation is also a cause of disruptive change, creating both opportunities and challenges for countries at all levels of development.

For innovation in the GMS to flourish, it is imperative to acknowledge that innovation is not an isolated activity. It takes place within a broad system that includes the government, the private sector, academia and research organizations, global innovation networks, and supporting institutions and policies. To facilitate innovation across the GMS, the capabilities of these different actors need to be built and links between them established, including across national borders. GMS ISD aims to accelerate progress toward achieving the objectives of the GMS-2030, while helping build a subregional innovation system capable of solving regional challenges and developing a dynamic environment for innovation across the subregion.

Connectivity. An aerial view of the Cao Lanh Bridge over the Tien River in Viet Nam, part of the Central Mekong Delta Regional Connectivity Project.

2

Vision of the Greater Mekong Subregion Innovation Strategy for Development

Purpose. The GMS Innovation Strategy for Development aims to build a subregional innovation system to enhance cross-border collaboration, thus maximizing innovation potential and efficiency across the subregion (photo by Shutterstock).

The GMS ISD aims to develop the GMS subregional innovation system and identify ways of enhancing cross-border collaboration and cooperation to maximize the potential and efficiency of innovation in the subregion (Figure 1).

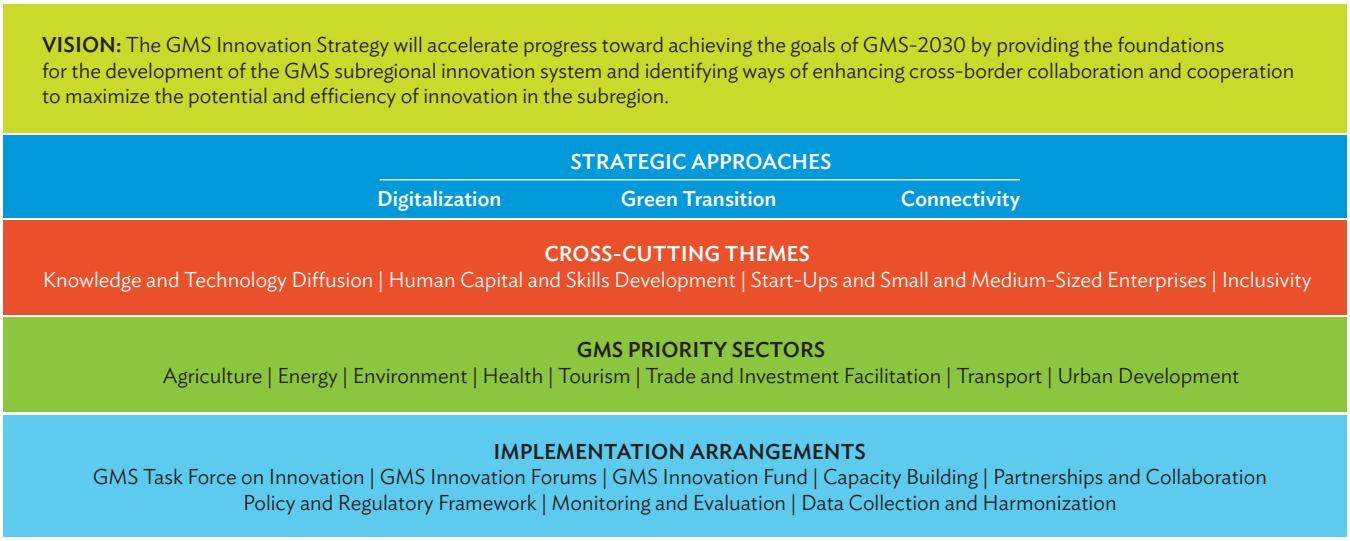
The GMS ISD adopts a systemic perspective, which highlights the potential challenges and benefits of developing a subregional innovation system in the GMS. A major challenge of a cross-border innovation system is the difference between the partner countries with respect to their size, capabilities and skills, internal and external networks, financial resources, and commitment. The GMS ISD will address these challenges by:

- providing a focus and direction for innovation in the subregion, bringing together key innovation stakeholders, and increasing the effectiveness of national innovation plans;
- facilitating policy dialogue, knowledge exchange among policymakers, and advocacy efforts to promote supportive policy frameworks;
- building the skills and capabilities of all stakeholders across national innovation systems;
- establishing and strengthening networks among different actors within and across national innovation systems and identifying complementarities and synergies in the different national and subnational systems;
- encouraging the diffusion of knowledge and green and smart technology across GMS borders;
- enhancing opportunities for cross-border innovative activities through support for entrepreneurship and the exchange of skilled individuals; and
- establishing a robust monitoring and evaluation mechanism to track the impact of the GMS ISD and ensure progress toward achieving its goals.

The GMS ISD will do this by supporting, strengthening, and helping build the components of each national innovation system and by addressing the weaknesses of the existing subregional innovation system.

> **“ The GMS ISD seeks to advance the GMS subregional innovation system and identify strategies for enhancing cross-border collaboration to optimize innovation potential and efficiency in the subregion.**

Figure 1: The Greater Mekong Subregion Innovation Strategy Framework



GMS = Greater Mekong Subregion, GMS-2030 = Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030.
Source: GMS Secretariat.

3

Strategic Approaches

The Green Transition. The GMS Program supports adoption of regional solutions to address climate change. It promotes green technologies in GMS interventions, including those that encourage energy efficiency and renewable energy.

The GMS ISD will have three complementary strategic approaches.

Strategic Approach 1: Digitalization

The ongoing global trend toward digitalization will increase global economic growth and productivity and improve the competitiveness of countries that fully embrace digital technologies. It offers hope in search for solutions to major global and regional challenges, such as those associated with climate change. However, if digitalization is not managed properly, it has the potential to exacerbate existing inequalities by widening individual and territorial digital divides, increasing global unemployment, and by replacing workers, restricting the development of global and regional value chains that have been a source of development for many countries.

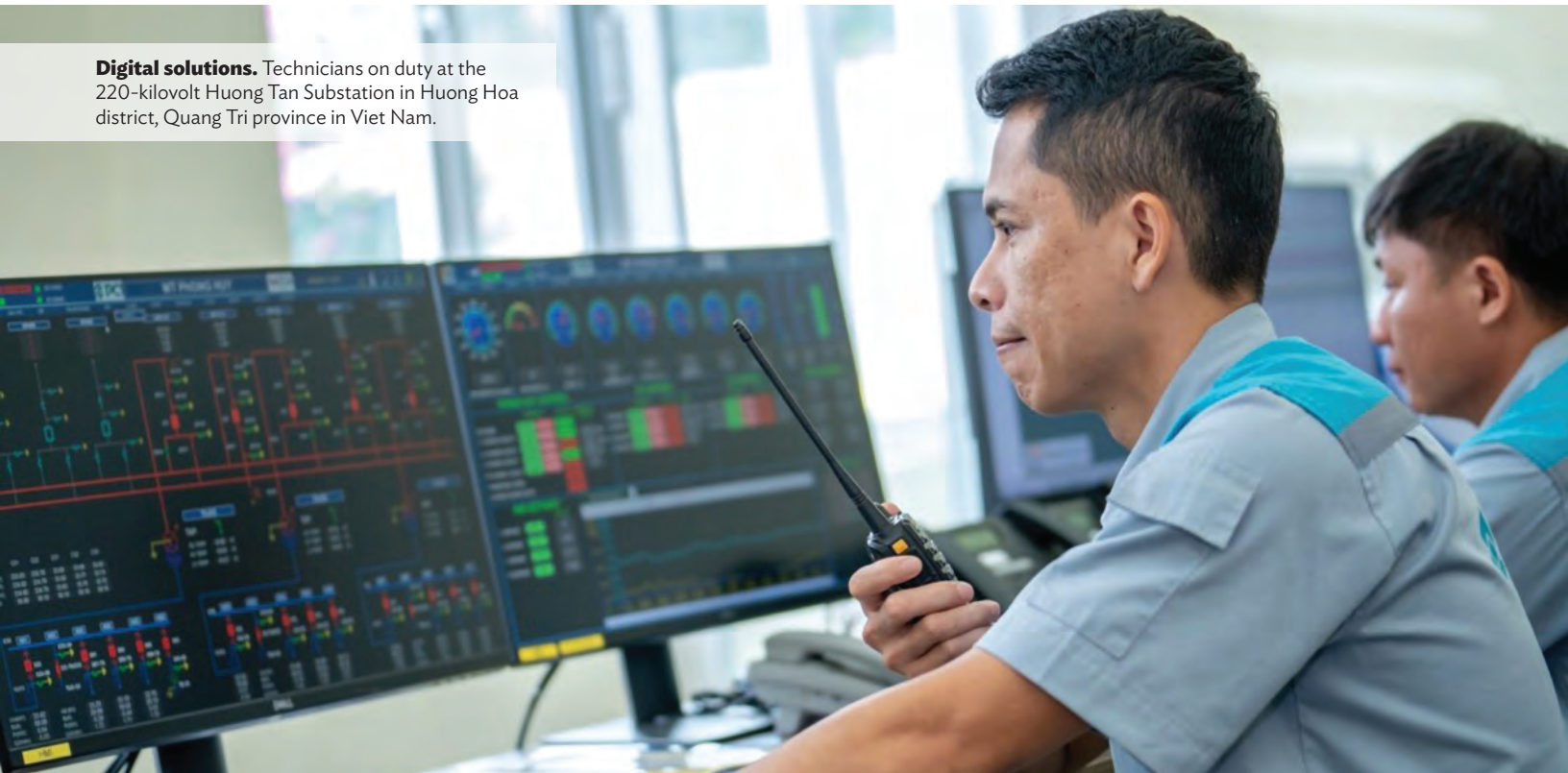
The subregion has the potential to embrace digitalization and manage disruptions. The GMS is home to a young, dynamic, and technology-aware population, with the potential to increase the rewards and reduce the costs of digital transition. Yet progress toward the adoption of digital technologies and the building of digital infrastructure in the subregion has been mixed. The causes of disparities in the development of the digital economy within the GMS include skills shortages, digital infrastructure gaps, and policy and regulatory constraints.

> **“ The GMS ISD will have three complementary strategic approaches: digitalization, the green transition, and connectivity.**

GMS governments must improve connectivity and close digital infrastructure gaps. Building digital skills is of utmost importance if workforces are to take advantage of the digital economy. Countries must invest in digital technologies that are broadly accessible across communities and subnational regions and provinces. They must also put in place appropriate legal and regulatory frameworks to support the digital transition, including cross-border cooperation.

The GMS Program will support national efforts to achieve this digital transition by:

- supporting the development of cross-border digital connectivity and infrastructure, encouraging cross-border digital trade, and strengthening information flows and investment;



Digital solutions. Technicians on duty at the 220-kilovolt Huong Tan Substation in Huong Hoa district, Quang Tri province in Viet Nam.

- encouraging the development of cross-border platforms and digital marketplaces that facilitate seamless transactions, collaboration, and information sharing to reduce connectivity barriers in the GMS;
- promoting digitalization across priority sectors within GMS countries;
- providing a forum for discussion, knowledge sharing, and coordination to develop appropriate and integrated legal, regulatory, and governance frameworks for digitalization;
- facilitating the building of a cross-border network of incubators, accelerators, and support institutes for technology start-ups, encouraging the sharing of best practices, and creating an enabling environment for cross-border digital entrepreneurship; and
- supporting subregional efforts to develop education, skills, knowledge, and opportunities that are essential to designing, implementing, and sustaining the digital transition across different value chains.

“ GMS countries have varying levels of capacity to reduce and manage climate-related risks and disasters, indicating the need for a collaborative and participatory approach.

Strategic Approach 2: The Green Transition

The GMS is vulnerable to climate-related risks and disasters, including drought, intense precipitation, and flooding. The subregion also suffers from air, land, and water pollution, as well as broader environmental degradation, all of which have significant impacts on human health. Climate change will have a negative effect on a range of sectors, especially agriculture and tourism. Environmental degradation, combined with rapidly changing land use, is bringing humans into closer contact with wildlife and livestock, increasing the risk of diseases developing and spreading. GMS countries have varying levels of capacity to reduce and manage these risks, indicating the need for a collaborative and participatory approach.

A shift toward economically sustainable growth is key to addressing these challenges within the GMS. Such a move would also provide an opportunity for the GMS, since it would lead to a growing market for sustainable products

Going green. Electric *tuk-tuks* in Bangkok, Thailand. The ADB BANPU Electric Tuktuks and Battery Project applies existing technology to contribute to the green transition.

and services driven by changes in consumer preferences and global regulatory requirements. Asia is expected to be the region of the world that benefits most from the development of green jobs, with an estimated 14 million green jobs created in the region by 2030[1] and 180 million by 2050.[2] While GMS countries have strategies in place that establish the green agenda,[3] gaps remain in terms of policies, regulatory frameworks, and capabilities.

While national policies are the key in encouraging shifts toward greener production, the cross-border nature of climate change and pollution and the need for cross-border solutions provide a strong rationale for the GMS Program to support national efforts in transitioning to a more sustainable economic model by:

- promoting efforts to diffuse and adopt green technologies across priority sectors through the GMS Program's sector strategies;
- supporting the adoption of low-carbon and climate-resilient infrastructure through its regional investment framework;
- mainstreaming the adoption of green technologies into GMS interventions, particularly those encouraging energy efficiency; renewable energy; "climate-smart" landscapes; effective land, water and forest management; and sustainable waste management;
- developing green cluster initiatives and programs to provide better support for links between regional green innovation actors (e.g., universities, research organizations, businesses, and investors);
- creating opportunities for cooperation and collaboration in building the skills needed to promote sustainable transitions;
- engaging in knowledge and technical support in undertaking assessment studies on green technology solutions for climate change mitigation and adaptation to promote climate resilience; and
- providing a forum for policy dialogues on regulatory frameworks to build climate-resilient infrastructure, policies for climate change adaptation, and measures for disaster risk reduction and management.

Strategic Approach 3: Connectivity

Global and regional connectivity are critical drivers of competitiveness, employment creation, and economic diversification. The enhanced connectivity of subregional markets is a source of inclusive development that can help reduce inequalities. By facilitating international trade, foreign direct investment (FDI), and regional and global value chains, connectivity is an important source of knowledge and technology in the digital and green realm, as in others.

Connectivity has been an important component of the GMS Program since its inception. The GMS Program has been successful in developing infrastructure, including roads, railways, and energy grids to enable the free flow of goods and people across borders; building ICT infrastructure that drives digital systems and enables interaction at distance; and providing forums to develop the policy, legal, and regulatory frameworks needed to encourage the rapid transit of goods and people across borders. It has enhanced connectivity between cities, special economic zones (SEZs), and people, stimulating innovation and facilitating the building of networked economic clusters and agglomerations. Through these efforts,

1 Association of Southeast Asian Nations (ASEAN). 2021. ASEAN and ILO Cooperate to Further Strengthen Enabling Policies for Green Jobs. 9 July. https://asean.org/asean-and-ilo-cooperate-to-further-strengthen-enabling-policies-for-green-jobs/.

2 Deloitte. 2023. New Deloitte Report: Asia Pacific Witnessing the Rise of a Green Collar Workforce; If Economies Rapidly Decarbonise, 180 Million Jobs to Be Created by 2050. 28 June. https://www2.deloitte.com/la/en/pages/about-deloitte/articles/asia-pacific-witnessing-the-rise-of-a-green-collar-workforce.html.

3 ASEAN and International Labour Organization (ILO). 2021. *Regional Study on Green Jobs Readiness in ASEAN: Final Report*. ASEAN and ILO.

the GMS Program has improved the circulation of knowledge and other flows between cities and regions, contributing to more innovation.[4]

GMS-2030 aims to deepen the spatial approach to development by expanding the network of economic corridors in the subregion and by building upon existing transport corridors to maximize effects and connections between them. Expansion of the economic corridors will focus on the border areas of the GMS countries, to enable trade, investment, and knowledge flows. GMS-2030 also envisions the further development and improvement of transport and logistic infrastructure to facilitate trade in goods, FDI, and the movement of people. This includes an increased emphasis on building railways; an expansion of capacity in sea, river, and dry ports; and the promotion of inland waterways, coastal shipping, and passenger services. GMS-2030 also covers investment in digital infrastructure, which will allow for the greater use of digital technologies for trade and transport facilitation, more efficient movement of goods, and the development of paperless trade and e-logistics. Given the rising demand for energy as a result of increased prosperity, GMS-2030 also highlights the need for cooperation and investments in infrastructure to improve the connectivity of energy grids.

The GMS ISD will promote the development of innovative connectivity solutions and improve connectivity to boost innovation performance in the GMS by:

- developing GMS economic corridors to connect cities with ports, SEZs, and other centers of economic production and consumption;
- promoting increased dialogue to encourage regulatory alignment, the sharing of best practices across the subregion, and cross-border regulatory schemes to enhance the different forms of connectivity and inward and outward flows and exchanges;
- sharing knowledge and technology solutions, as well as business models for last-mile energy connectivity, including for small, mini, and micro-grid and battery storage solutions and last-mile connectivity in border and harder-to-reach areas;
- enhancing efforts at building connectivity and cross-border networks for skills development and exchange; and
- developing GMS smart cities as centers of innovation.

[4] Asian Development Bank (ADB). 2021. *The Greater Mekong Subregion 2030 and Beyond: Integration, Upgrading, Cities, and Connectivity*. https://www.adb.org/publications/gms-2030-integration-upgrading-cities-connectivity.

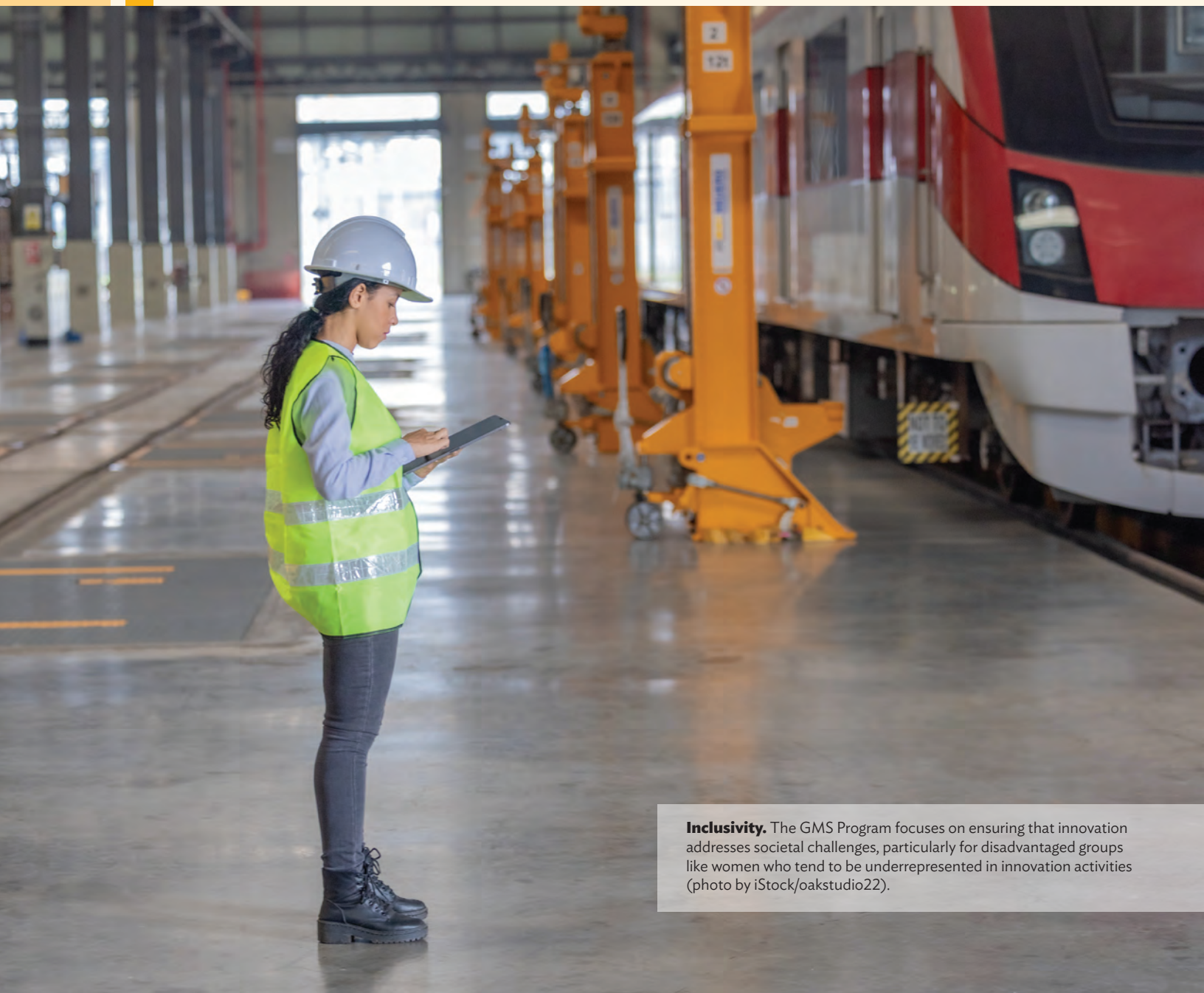
Digital technology and trade. GMS-2030 encourages greater use of digital technologies for trade and transport facilitation, more efficient movement of goods, and the development of paperless trade and e-logistics (photo by Shutterstock).

Hekou port, Yunnan Province. This border crossing is a major land port for bilateral trade between the PRC and Viet Nam. Connectivity has always been an important component of the GMS Program. Infrastructure are developed and improved to enable the free flow of goods and people across borders (photo by iStock/Kum Seong Wan).

Importance of regular dialogue. ADB meets with cross-border officials to seek their views on policy, regulatory, and procedural issues hindering the cross movement of people, goods, and vehicles. The GMS ISD promotes increased dialogue to encourage regulatory alignment, the sharing of best practices across the subregion (photo by J. Duque-Comia).

4

Cross-Cutting Themes



Inclusivity. The GMS Program focuses on ensuring that innovation addresses societal challenges, particularly for disadvantaged groups like women who tend to be underrepresented in innovation activities (photo by iStock/oakstudio22).

In addition to the three strategic approaches, several common themes will be addressed through the GMS ISD.

> **The GMS ISD will address several key cross-cutting themes, including knowledge and technology diffusion, human capital and skills development, start-ups and small and medium-sized enterprises, and inclusivity.**

Knowledge and Technology Diffusion

The diffusion of knowledge and technology, including through regional cooperation and development, is the most crucial source of innovation and technological change for most countries situated away from technological frontiers. Increased regional and global integration through enhanced levels of international trade, FDI, and integration into global and regional value chains are important channels through which the diffusion of knowledge and technology can occur.

The GMS ISD will encourage the sharing and diffusion of knowledge and green and smart technology among GMS countries. By building infrastructure connectivity and facilitating trade through the adoption of digital solutions and policy dialogue to improve regulatory alignment, the GMS ISD will facilitate knowledge diffusion through enhanced trade and FDI. It will support the development and expansion of existing cross-border knowledge networks, including the encouragement of cross-border mobility and collaboration for knowledge acquisition and sharing. The GMS ISD will also support national innovation systems by helping identify and develop missing actors through benchmarking across the subregion, and by strengthening links between existing actors to improve the capabilities and opportunities for knowledge diffusion within and across borders.

Human Capital and Skills Development

Human capital is crucial for innovation, with individual creativity, knowledge, and skills helping foster a culture of innovation, supporting technological change and diffusion, and promoting entrepreneurship. It is also crucial in the diffusion and adoption of existing technologies. Developing specific skills for innovators and entrepreneurs in emerging technologies, building the skills and competencies of institutional actors, and implementing innovation strategies are essential.

The GMS Program will complement national efforts to build innovation skills by encouraging the pooling of resources and expertise to enable countries to address common challenges and help close gaps in innovation skills. The GMS ISD 2030 will support the development of technical and digital skills in the workforce through vocational and technical training programs tailored to key industries. These programs, developed with industry leaders, will focus on upskilling, reskilling, and fostering innovation-specific skills. The GMS Program will also engage in capacity-building activities targeting policymakers and other institutional actors to support the design and implementation of innovation policy. In doing so, it will consider countries that are lagging, ensuring that they benefit from increased cooperation and collaboration, further speeding up the pace of catch-up. Training programs will be tailored to the innovation priorities in the subregion.

The GMS Program will facilitate cross-border exchange, allowing students, researchers, and others to gain exposure to diverse perspectives, practices, and innovation ecosystems, enhancing their creativity, adaptability, and communication skills, while fostering an environment conducive for innovation across the subregion. Using the GMS Knowledge Network,[5] the GMS Program will encourage the development of networks and partnerships among educational institutions, research centers, innovation hubs, and industry players to promote collaboration, co-creation, and knowledge exchange.

[5] The objective of the GMS Knowledge Network is to provide expertise, stimulate discussion, and raise awareness on relevant and emerging issues in the GMS. GMS. 2022. *Greater Mekong Subregion Knowledge Network*. https://greatermekong.org/g/sites/default/files/GMS-Knowledge-Network-1-December-2022-single-pages-QRCODE-smallfilesize.pdf.

By supporting intermediary organizations, such as incubators and accelerators, the GMS Program will target the skills of innovators and entrepreneurs, providing aspiring innovators with mentorship, incubation services, access to funding, and links to markets.

Start-Ups and Small and Medium-Sized Enterprises

While most research and development activity is undertaken by large firms, innovative start-ups and small and medium-sized enterprises (SMEs) are increasingly important, especially in the context of digital and green technologies. They are also likely to be strongly affected by the disruptive nature of innovation. Within the GMS, there is a small but growing number of innovative start-ups. Start-ups and SMEs often face different and often higher barriers to innovation than those faced by larger businesses, including financing and commercialization challenges. They need to build the skills necessary to develop and commercialize innovations, and to navigate complex regulatory aspects.

The GMS Program will help ease the burden associated with innovation for start-ups and SMEs, supporting intermediary organizations in their efforts to encourage innovation. A specific focus will be on removing obstacles to innovation and growth, specifically by supporting attempts by SMEs to expand beyond national borders. The GMS Program will encourage initiatives to link SMEs and start-ups, first locally and then with large, innovative, and regionally and globally integrated firms within the GMS. These SMEs will then have an opportunity to enter regional and global value chains. Large firms will also benefit from their greater access to local

Innovation in high-vale horticulture. Aerial view of farmers at work in Dalat Hasfarm in Lam Dong, Viet Nam. ADB's High-Value Horticulture Development Project has successfully introduced climate-controlled greenhouse technology.

specialized skills and knowledge. By working with SMEs, larger firms will be able to build local supply chain resilience. The GMS Program will support digital and green transition start-ups, common enabling regulatory support environments, and the facilitation of domestic and international knowledge sharing through network development. The GMS Program will support efforts to establish an innovation fund to assist SMEs and start-ups to commercialize and scale up their innovative activities.

Inclusivity

Innovation has the potential to increase inequality by destroying traditional economic activities and employment. Disadvantaged groups, including women, tend to be underrepresented in innovation activities. Because of their limited access to education, networks, and finance, women account for a minority of science and engineering workers, with younger and rural populations also underrepresented. These inequalities are self-reinforcing: female innovators tend to target innovations that can resolve the challenges that women face, thus the lack of female innovators limits the solutions to such challenges. The lack of digital literacy among older generations often precludes them from being involved in societal change.

The GMS Program will address different dimensions of inclusivity, ensuring innovation addresses the challenges facing society, including disadvantaged groups. Through its capacity-building activities and the facilitation of policy dialogues, the GMS Program will promote the inclusion of women and other underrepresented groups. It will encourage inclusivity in the innovation process, facilitating access to resources across the GMS. This will include the building of gender-sensitive infrastructure, initiatives to support start-ups and SMEs led by women, and training and capacity building targeting underrepresented groups.

5

Sector Strategies

Innovation in urban development. The GMS ISD promotes smart city concepts and digitalization strategies to boost urban efficiency, connectivity, and sustainability with strong safeguards (photo by Shutterstock).

The GMS ISD focuses on the eight GMS priority sectors. The GMS ISD sector strategies are closely aligned with the corresponding GMS sector strategies and will be addressed in tandem by the GMS sector working groups.

Agriculture

Agriculture is vital for the GMS as it is a major source of production and employment in rural and border areas. Agriculture also has the potential to become a major source of safe and environmentally friendly products.[6] However, the sector is fragmented, as the GMS contains millions of small-scale farmers and SMEs. The GMS countries have differences in their food safety systems and in their compliance with sanitary and phytosanitary regulations. In addition, adopting sustainable climate-smart agriculture (CSA) practices is a long and complex process.

The GMS Program has sought to develop inclusive agricultural value chains, harmonize food safety standards, and improve the control of transboundary pests and diseases as a way of encouraging greater trade. GMS-2030 has added support for CSA, promoting climate-resilient production practices and technologies, and incentivizing the sustaining of natural resources. These will be achieved by developing inclusive, gender-conscious, agri-food value chains; financing climate-friendly agribusinesses; introducing crop and livestock safety and quality control systems; and promoting agricultural adaptation in the context of the water–food–energy–climate nexus. The GMS Strategy for the Transformation of Agri-Food Systems 2030 focuses on innovative aspects related to the digitalization of the sector and climate-related issues.

CSA practices are well-established and have proven effective in mitigating climate shocks and meeting rising food demand. Since CSA strategies depend upon agricultural climate zones and development levels, there is a strong rationale for cross-border collaboration.

The digitalization of agriculture offers great potential to improve yields and resource use efficiency, enhance quality control and traceability for food safety, and monitor and manage agricultural pollution. Digital financial platforms can provide a source of financing for small-scale farmers to help them implement CSA and digital technologies. However, to optimize the uptake of digital technologies, policy responses are needed to build skills for digital adoption; provide incentives; facilitate data sharing to provide secure, representative, and inclusive data ecosystems; and provide farmers with knowledge of digital agricultural solutions.

> **“ The GMS Program operates through eight priority sectors, which will be addressed by the GMS ISD sector strategies aligned with the corresponding GMS Program sector strategies.**

The GMS ISD will encourage CSA and digitalization adoption by:

- strengthening agricultural extension services to help develop the knowledge and skills needed to implement CSA and digital practices effectively;
- enabling farmers to benefit from the integration of CSA and digitalization practices into their farming systems through training programs and demonstration projects;
- supporting the development of farmer organizations (such as agricultural communities, farmers and cooperative associations, women’s groups, and producer organizations), strengthening rural social networks, and facilitating the sharing of knowledge on CSA practices and digital solutions;
- encouraging the adoption and spread of digital technologies, including agricultural robotics and drones, controlled

[6] ADB and GMS. 2018. *Strategy for Promoting Safe and Environment-Friendly Agro-Based Value Chains in the Greater Mekong Subregion and Siem Reap Action Plan, 2018–2022*. https://greatermekong.org/sites/default/files/GMS%20Value%20Chain%20Strategy%20%26%20SR%20AP%202018-2022_ADB%20published-May%202018.pdf.

environment agriculture, and farm automation, through the development of digital skills and basic rural ICT infrastructure; and

- facilitating cross-border policy dialogue and peer learning on developing interoperable regulatory frameworks and digital infrastructure standards for the agriculture sector.

Energy

Economic development, population increases, and urbanization have increased demand for energy in the GMS significantly. Regional cooperation and cross-border electricity trade offer an important potential solution to these growing energy needs. Cross-border energy trade also has the potential to enable more stable electrical grids as electricity generation is diversified. Given the potential for renewable energy in the subregion, the prospects for trade in clean energy are high.

The GMS Energy Sector Strategy 2024–2030 identifies further challenges and opportunities for cooperation within the GMS in the energy sector. These include improvements to the power interconnection infrastructure, opportunities for energy efficiency and conservation, smart grids for greater cost-efficiency and reliability, and ensuring a just transition. Building human capacity and increasing private sector participation also need to be important components of the energy strategy for the GMS.

To achieve the GMS energy cooperation program vision of a secure and green energy future for the subregion, the GMS Energy Sector Strategy, 2024–2030 has three strategic priorities: (i) expanding regional trade in clean energy, (ii) implementing regional efficiency and cooperation initiatives, and (iii) improving capacities for the energy transition. Innovation is at the heart of these strategic priorities, with the sector strategy aiming to facilitate the adoption of digital solutions to the transition to

Digital technology in renewable energies. An engineer monitors the operations of the 1,070-megawatt Nam Theun hydropower plant in the Lao PDR, partially funded by ADB.

smart grids, an enhanced spatial approach to interdependent development, and extended policy dialogue, knowledge production, and sharing.

The GMS ISD will support the GMS Energy Sector Strategy, 2024–2030 by:

- facilitating forums for sharing knowledge on clean energy technology solutions, and inviting members of the ASEAN Energy Regulators Network and other relevant stakeholders from outside the GMS;
- supporting capacity building for policymakers, implementing agencies, and regulators to develop the skills and competencies required for the adoption of green technology solutions and for greater cross-border energy trade in the subregion;
- facilitating policy dialogue to align systems, regulatory frameworks, and institutional arrangements to expand regional power markets and cross-border energy trade;
- encouraging the adoption of technological solutions that can be applied in resilient energy systems and emergency response mechanisms, and integrating energy and disaster risk reduction measures to enhance energy sector resilience and adaptability to climate change; and
- supporting inclusive access to electricity through a focus on energy access initiatives, promoting off-grid and rural electrification projects, and empowering marginalized communities through clean and affordable energy solutions.

Environment

More than 200 million people in rural areas in the GMS depend on their surrounding environment for food, water, energy, and income. This natural capital includes farmlands, wetlands, mangroves, forests, and other ecosystems and accounts for 20%–55% of the subregion's wealth. Such a heavy reliance on natural ecosystems raises the possibility of an overexploitation of natural resources and an associated reduction of biodiversity, pollution, and vulnerability to climate change. Environmental degradation and rising greenhouse gas emissions are putting sustained long-term growth at risk. Poor waste management, including plastics pollution, and water-related stresses due to climate change and human interventions represent a growing challenge across the GMS.

The GMS-2030 Strategic Framework for Accelerating Climate Action and Sustainability addresses these challenges through four interconnected thematic areas: (i) enhancing climate and disaster resilience for communities; (ii) supporting a just and inclusive low-carbon transition; (iii) enhancing pollution control and fostering a circular green economy; and (iv) deploying nature-based solutions to promote biodiversity, ecosystem restoration, and improved livelihoods.

The GMS Program's approach to these challenges to the environment is to build policy capacity, promote knowledge sharing and cooperation on green technologies, establish measures to support and de-risk projects and investments, and facilitate public and private sector involvement. The GMS-2030 highlights the importance of deploying digital technologies for climate actions and environmental sustainability and financing low-carbon and climate-resilient infrastructure and technologies.

Innovation is a key component of GMS Program activities to preserve the environment; meet rising demands for food, energy, water, and other natural resources; ensure resources are available for future generations; and help to build climate resilience. Innovation can ensure more efficient use of natural resources, identify alternatives to them, develop cleaner products such as carbon-negative concrete, and support systems that will reduce resource consumption, such as automated water and carbon pricing, and natural resource management through AI-enabled pollution monitoring and control, carbon capture and storage, and drones for forest management and biodiversity monitoring.

The cross-border nature of many environment-related challenges emphasizes the need for collaboration on transboundary

conservation. GMS countries need to protect and preserve shared natural resources, formulate cross-border strategies for climate change mitigation and adaptation, improve cross-border sustainable water resource management, and put in place sustainable land use and forestry management.

The GMS ISD will help meet the ongoing environmental cross-border challenges identified in GMS-2030 by:

- providing a forum for countries to discuss, share best practices and identify areas for improvement, and aim for regulatory alignment on the diffusion and adoption of green technologies;
- promoting the use of environmentally friendly technologies in land-use planning, integrated water use and management, and natural resource management to preserve valuable ecosystems and biodiversity;
- encouraging the diffusion of knowledge and technology through the intensification of regional global value chains, innovation forums, and demonstration and knowledge-sharing events;
- promoting investment in green technologies as a means of stimulating innovation, employment, and a more sustainable subregion;
- informing communities, entrepreneurs, and policymakers of relevant innovation models, including frugal and small-scale innovation and innovation models that can preserve natural resources, while serving the needs of rural communities; and
- supporting the upgrading of the knowledge base and practical skills of innovation stakeholders through regional knowledge sharing, capacity-building events, and skill-building workshops.

Health

GMS countries face many similar health challenges. Increases in cross-border mobility and trade due to increased connectivity in the GMS raise the risk of communicable disease transmission, particularly in border areas where large migrant populations pass through or reside. The incidence of noncommunicable diseases, including those related to aging societies, is also increasing. Climate change is adding to these common health challenges, with heat waves, extreme weather events, heat-related urban air pollution, and climate-induced effects on food yields, water flows, and vector-borne diseases impacting health and broader socioeconomic outcomes.

These common challenges call for greater cooperation in the health sector, with the COVID-19 pandemic highlighting the importance of regional cooperation. GMS countries need to be prepared and proactive as they consider future health challenges. They need to develop a regional health infrastructure, put in place common regulatory frameworks, and improve policy coordination to build the resilience of national health services to public health emergencies.

The GMS Program is strengthening GMS countries' health systems to develop core capacities to respond to health threats. This includes projects to build the capacity of national health systems in preventing, detecting, and responding to transnational health threats, and mechanisms to strengthen multisector cooperation in responding to communicable diseases. Additional focal areas include the strengthening of health systems in border areas, the development of capabilities and human resources through intraregional capacity building, and the encouragement of regulatory convergence for medical goods and pharmaceuticals, universal health coverage, and mitigating the health impacts from environmental damage and climate change.

The GMS Health Sector Strategy, 2024–2030 aims to support the health sector through two main pillars: (i) building regional health security by strengthening the core capacities of national health systems to prepare and respond to public health emergencies; and (ii) strengthening the equity and resilience of health systems through improvements in access to health care products, the health infrastructure and workforce, and migrant health. Digitalization of health information

systems and the adoption of digital technologies are important components of the sector strategy.

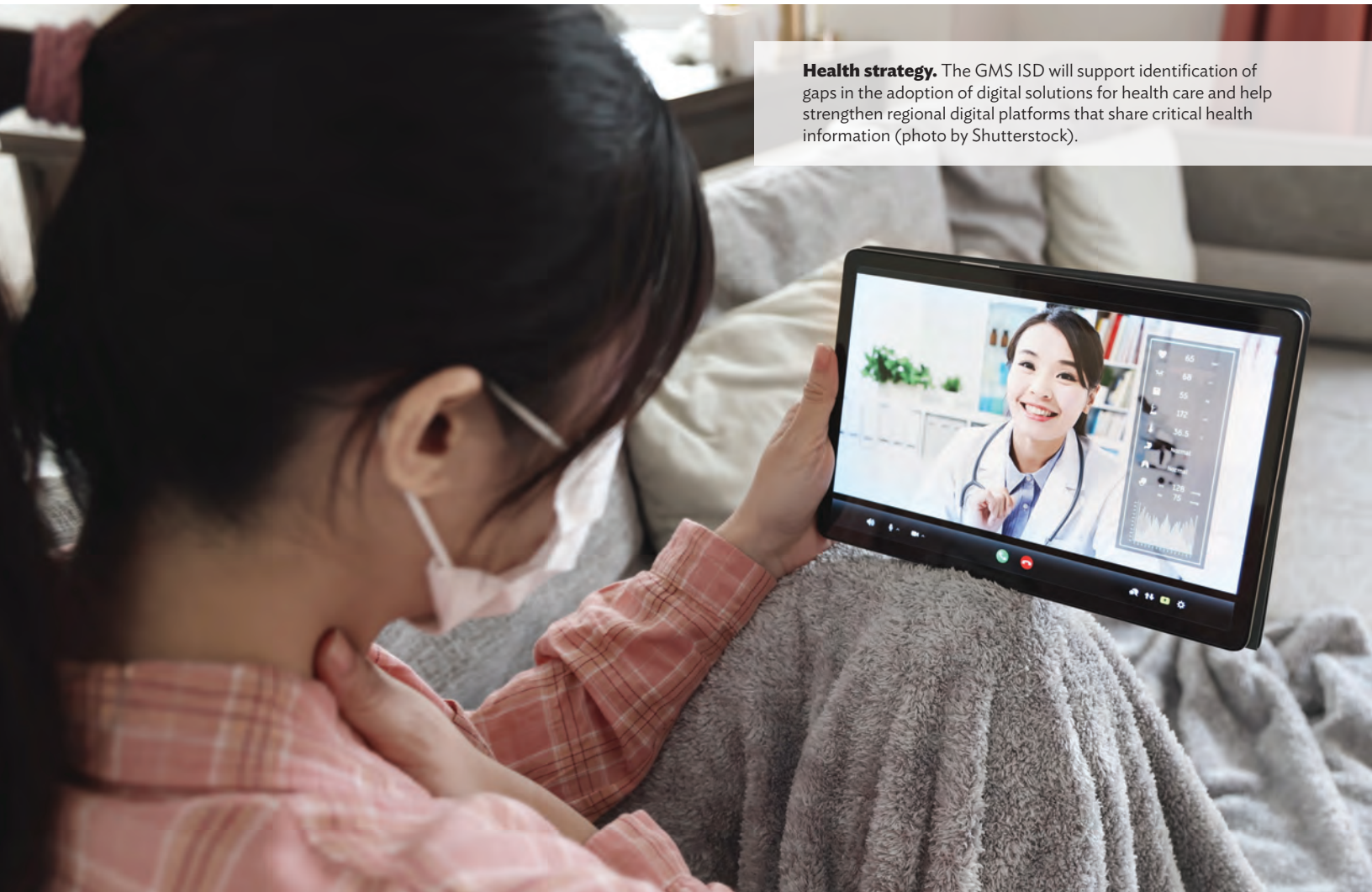
The GMS ISD will support the GMS Health Sector Strategy 2024–2030 by:

- identifying gaps in the adoption of digital solutions for health care, helping to strengthen regional digital platforms that share critical health information, supporting early warning systems and surveillance data to enhance public health surveillance, disease prevention, and emergency preparedness;

- assisting in the development and implementation of training programs for regional health cooperation, including cooperation on cross-border threats, climate-related risks, epidemic preparedness, portable insurance, and universal health coverage;

- supporting cross-border learning and the sharing of best practices across the subregion, including on strengthening governance and regulatory frameworks, developing public–private initiatives to improve the availability of health products, and health workforce development; and

- facilitating regional policy dialogue to encourage the adoption of systems and approaches to increase collaboration on health, including the mutual recognition of professional qualifications to support cross-border movement, digital approaches and policies to address health challenges, and knowledge exchange and peer learning on efforts to expand universal health coverage.



Health strategy. The GMS ISD will support identification of gaps in the adoption of digital solutions for health care and help strengthen regional digital platforms that share critical health information (photo by Shutterstock).

Tourism

While tourism has been a vital and successful sector in the GMS, driving economic growth and generating employment, it continues to face significant challenges. These include improving the quality of human resources, upgrading infrastructure in secondary destinations, enhancing destination management, strengthening marketing strategies, and facilitating travel through better connectivity and policy support. Concerns about the potential impact of climate change on tourism also loom large.

The GMS Tourism Sector Strategy aims to address these challenges by: (i) building human capabilities by implementing regional standards, capacity building for public officials, and strengthening tourism support services; (ii) improving tourism infrastructure, including airports, river and marine passenger ports, and roads in secondary destinations; (iii) enhancing visitor experiences and services through investing in secondary destinations, developing multicountry experiences, and creating spatial and thematic destination plans; (iv) creating marketing opportunities by raising awareness, sharing market research data, and strengthening public–private marketing; and (v) facilitating regional travel by advocating for the implementation of services agreements, addressing tourist visa policy gaps, and improving border facilities and management.

COVID-19 and the subsequent cautious reopening of GMS countries had a significant impact on the tourism sector. In response, GMS-2030 aimed to make tourism more resilient, inclusive, and sustainable. GMS-2030 further envisaged a shift toward higher value-added sustainable tourism with longer stays and the inclusion of secondary destinations. To achieve this, GMS-2030 called for a greater role for the private sector in infrastructure development, standards implementation, and technology deployment.

Innovation and new digital technologies are increasingly important, with more than half of travelers researching their trip online and more than a third purchasing tourism services online. Digital technologies allow tourism businesses to understand and rapidly respond to changing visitor expectations, preferences, and behavioral patterns. Social media enable SMEs to connect rapidly with global markets. Digital tools can also be employed in developing disaster response and preparedness plans and risk communication protocols to ensure the safety and well-being of tourists.

The GMS ISD aims to accelerate progress toward the goals of the GMS Tourism Sector Strategy by:

- building capacity for digital technology adoption, particularly in relation to interoperable digital systems, such as digital payment systems and quick response (QR) codes for smart ticketing;

Innovation in tourism. New digital technologies allow businesses to understand and rapidly respond to changing visitor expectations, preferences, and behavioral patterns (photo by Shutterstock).

- promoting the adoption of green technologies, waste management solutions, and reductions in carbon footprints to preserve the subregion's natural beauty and ecosystem and cultural heritage and to shift the tourism sector toward lower-carbon, resource-efficient tourism growth;

- encouraging collaboration between tourism stakeholders, technology companies, government agencies, and local communities to encourage higher value-added tourism and to preserve and promote the subregion's cultural heritage; and

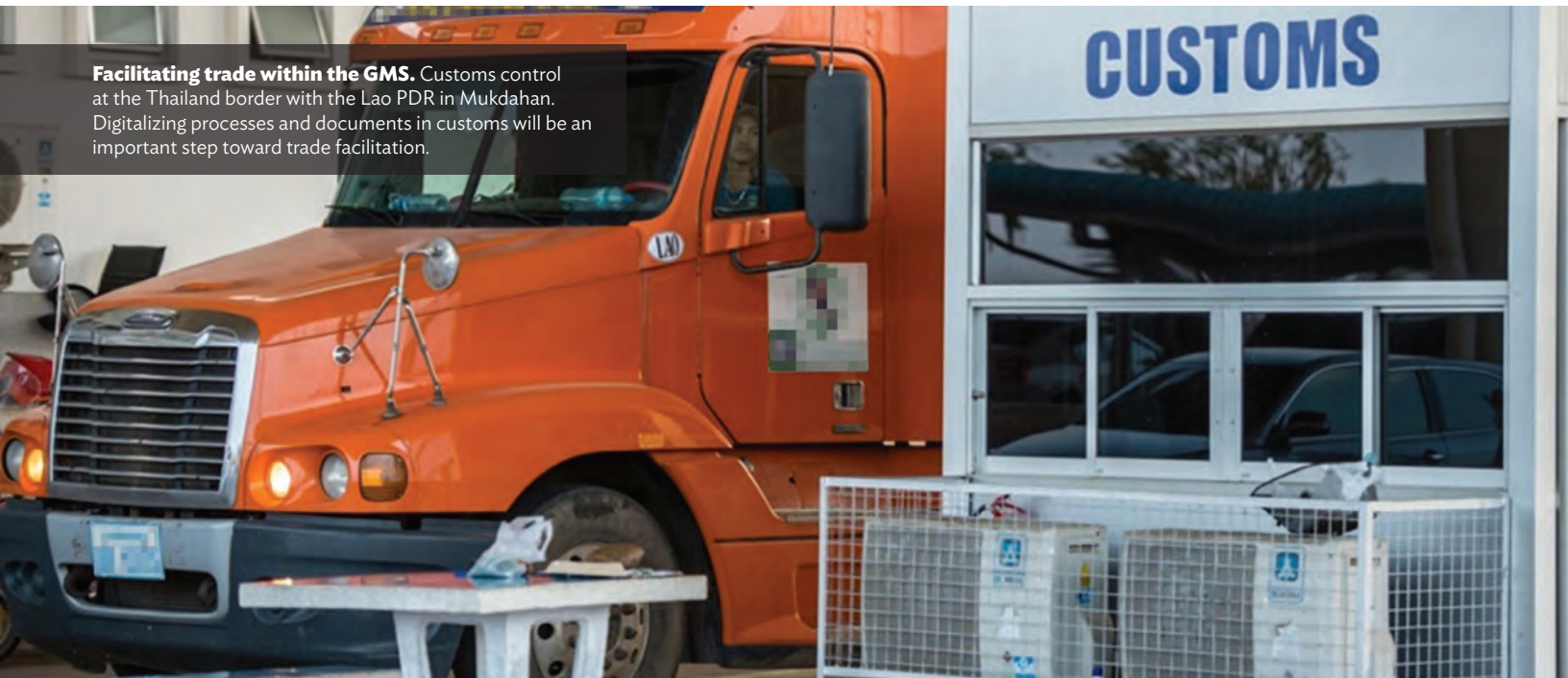
- facilitating dialogue between GMS policymakers and other stakeholders to encourage collaboration on common regional tourism standards, promoting GMS-wide recognition of vocational and other training, data sharing, and common digital solutions, and reducing barriers to the registration of tourism business entities.

Trade and Investment Facilitation

The GMS Program has achieved notable successes in building the infrastructure and supporting the logistics needed to support trade. These efforts have been aided by a GMS Task Force on Trade and Investment, which has a work program under three main pillars: (i) digitalization—advancing trade digitalization, especially the legal recognition of electronic trade documents and increasing investments in digital infrastructure to bolster digital connectivity; (ii) improving the business climate—creating a favorable legal and regulation environment for diversifying trade and investment, attracting foreign investment, and developing micro, small, and medium-sized enterprises; and (iii) capacity building to maximize the benefits of free trade agreements.

Improving trade and transport facilitation is a priority for the GMS Program through its Cross-Border Transport Facilitation Agreement, which addresses policy and regulatory issues as a means of facilitating trade across the subregion. A GMS trade facilitation strategy will further support these efforts, and will aim to support countries to ease border processes, encourage the use of electronic documents, and improve access to e-commerce, online financial services, and electronic payment gateways for SMEs.

GMS-2030 identifies several focal areas for trade facilitation, including: (i) putting in place electronic customs transit systems to eliminate duplication of trade procedures; (ii) modernizing customs clearance using digital technologies and risk-based systems to monitor compliance; (iii) encouraging



Facilitating trade within the GMS. Customs control at the Thailand border with the Lao PDR in Mukdahan. Digitalizing processes and documents in customs will be an important step toward trade facilitation.

electronic customs clearance and digital tracking through blockchain and other technologies; (iv) strengthening capacities for implementing sanitary and phytosanitary measures; (v) encouraging the adoption of single-window arrangements for customs, health, sanitary and phytosanitary, veterinary, and other regulatory requirements; (vi) improving cooperation under regional free trade agreements to address tariff and nontariff barriers and to facilitate and promote the free flow of goods and services; (vii) enhancing collaboration on trade digitalization and the establishment of paperless trade platforms, advocating for the extensive adoption and legal recognition of electronic trade documents, including but not limited to e-bills of lading, e-warehouse receipts, e-invoices, etc.; (viii) strengthening cooperation on standards and conformity assessment to enhance trade facilitation and increase trade flows; and (ix) easing constraints on the flow of investment within the subregion and FDI from outside the GMS.

The GMS ISD will support the work of the Working Group on Trade and Investment by:

- supporting the promotion of cross-border e-commerce and digital marketplaces, especially for SMEs and micro-businesses with a strong presence in e-commerce in the subregion;
- aiding the development of digital skills in the business sector, in SMEs and start-ups specifically, enabling them to make use of digital trade facilitation platforms to trade online;
- encouraging information sharing with private sector actors on digital solutions that streamline customs procedures and clearance processes for cross-border trade;
- encouraging and supporting the use of disruptive technologies in traditional and new areas of trade facilitation, including record management, risk management, implementation of authorized economic operators and national single windows, time-release studies, electronic trade documents, paperless trade platforms, and similar efforts;
- facilitating cross-border dialogue and cooperation on policies crucial in facilitating trade, including data governance, cybersecurity, digital infrastructure standards, standards and conformity assessment, and the harmonization of sanitary and phytosanitary standards;
- building the capabilities of policymakers, customs officials, and logistics operators involved in cross-border trade to improve trade facilitation policies and practices; and
- promoting dialogue on efforts to encourage and incentivize trade in environmentally friendly goods, by reducing tariffs and mitigating the costs and constraints of nontariff measures.

Transport

Transport is a key component of the GMS Program, being a driver of economic growth, international trade, and FDI. Transport systems provide the networks on which GMS countries depend for internal commerce and their integration into the global economy. Transport links facilitate the movement of people, enabling access to employment and services such as health and education, and providing tourism infrastructure. Transport has significant environmental and social impacts, including physical impacts and the production of greenhouse gases. Climate-related extreme weather events impact transport infrastructure and disrupt and delay cross-border trade.

The GMS Transport Sector Strategy 2030 has a long-term vision of developing a seamless, efficient, reliable, and sustainable transport system in the GMS. To achieve this, the GMS Program has identified the following strategic areas: (i) completing the GMS transport corridor network and improving links with South Asia and Southeast Asia, (ii) facilitating cross-border transport, (iii) strengthening intermodal transport links, (iv) promoting the development of logistics, (v) improving road asset management, and (vi) enhancing road safety.

Innovating in the transport sector. Train passengers using infrastructure developed by the ADB Dali–Lijiang Railway Project.

GMS-2030 has a further focus on climate change and its implications for the transport sector. It aims to support climate-resilient road transport; encourage a shift in transport towards railways, waterways, and green freight; and develop public transport infrastructure and services to support green cities.

The GMS ISD will help build innovative capabilities and identify innovative solutions in the transport sector by:

- promoting the digitalization of the transport sector, including the implementation of intelligent transport systems and ride-sharing platforms to improve traffic management and reduce greenhouse gas emissions;

- encouraging dialogue and knowledge sharing on the policy and regulatory reforms needed to facilitate cross-border transport and trade, including innovative approaches to enhance the implementation of the Cross-Border Transport Facilitation Agreement;

- helping build the human capabilities, including technical and managerial skills needed to identify, implement, and understand technological solutions to transport challenges;

- enhancing the capacities of policymakers to develop sustainable transport infrastructure and encourage the adoption of sustainable transport solutions, including improvements in vehicle efficiency, the mobility of people, and the adoption of low-carbon vehicles and fuel technologies; and

- encouraging the development of knowledge networks on green and digital transport solutions to facilitate research on innovative solutions to transport planning across the subregion.

Urban Development

Continued urbanization in the GMS has led to congestion and pollution. GMS cities contribute to climate change and the increased pollution of rivers and seas since the biggest urban areas are close to riverbanks and coastal areas. In turn, climate change and climate-related weather events have strong negative impacts on urban areas, which are magnified by the heavy concentration of people and economic activity in cities.

From an innovation perspective, urbanization creates many opportunities, including the possibility of benefiting from agglomeration effects and the potential for rapid adoption of digital and other advanced technologies. Networked cities linked to economic corridors

and border areas can enhance the returns on connectivity investments being made through the GMS Program (footnote 4).

GMS-2030 emphasizes the need to build the resilience of cities by: (i) enhancing the use of digital technologies, including promoting ICT to improve responses to crises; (ii) ensuring financial sustainability by building the capacities of city authorities to mobilize innovative green financing and to build partnerships with the private sector; and (iii) changing urban travel options and patterns through multimodal solutions such as mass transit systems, spaces for cycling and walking, and e-vehicles.

In the longer term, GMS-2030 aims to build livable cities through green and smart city development and improving disaster and climate change resilience. GMS-2030 supports the development of interconnecting city networks that can improve competitiveness and resilience, while benefiting from economies of scale and agglomeration.

The GMS ISD will contribute to the ambitions of GMS-2030 by:

- promoting moves toward smart city concepts and digitalization strategies to enhance urban efficiency, connectivity, and sustainability, while ensuring robust safeguards;

Green, competitive, and inclusive cities. Solar panel installation at Grand Bangkok Boulevard, Thailand. GMS-2030 aims to improve disaster and climate change resilience .

- facilitating knowledge sharing on climate change adaptation in urban areas to reduce their vulnerability to climate change impacts and encourage adaptive behavior; and

- encouraging the development of networked cities and developing economic corridors that enhance connectivity between urban areas, SEZs, and people and encourage innovative networks across cities.

Developing livable cities. Aerial view of Phnom Penh City in Cambodia. GMS-2030 aims to build livable cities through green and smart city development and improving disaster and climate change resilience (photo by Shutterstock).

Trade and investment facilitation. Huu Nghi Border Gate in Lang Son province, Viet Nam. ADB supported improvements in the border gate to enhance handling of immigration and emigration of cross-border passengers, and custom clearance of goods.

6

Implementation

Innovation Forum. The GMS Program will host regular forums to promote knowledge sharing and learning on innovation and innovation policy (photo by Shutterstock).

The GMS ISD will be implemented in close coordination with the strategies and plans for the GMS priority sectors. The GMS ISD will be aligned with the three strategic approaches for innovation and mainstreamed into the GMS Regional Investment Framework.

Greater Mekong Subregion Task Force on Innovation

A GMS Task Force on Innovation will be established to support the implementation of the GMS ISD. The task force will provide direction for the GMS ISD, identify priorities, and monitor and report on progress. The task force may be led by representatives from science and technology ministries from each of the GMS countries, but will include representatives from the two regions of the People's Republic of China, Guangxi Zhuang Autonomous Region and Yunnan, and draw on expertise from other ministries.

The task force will report to the GMS Senior Officials' Meeting and will be supported by the GMS Secretariat. It will work closely with GMS sector working groups, task forces and other relevant bodies, coordinating and consulting on the priorities for innovation in the GMS Program to ensure these are reflected in the activities of the different groups.

Innovation Forums

To facilitate knowledge sharing and learning on innovation and innovation policy, the GMS Program will organize regular GMS innovation forums. These will be conducted on the sidelines of the GMS summits, ministerial meetings, and other GMS events so they can convene different innovation stakeholders from across the GMS, and beyond.

Innovation forums will be themed events, and may focus on strategic approaches to digitalization, the green transition, connectivity, sector-specific innovation approaches, as well as cross-cutting issues. Given the importance of technology diffusion and intellectual property rights for the innovation process, these will be key components of the forums. By bringing together stakeholders and expertise, the forums will allow for more focused knowledge exchange and deeper learning on these themes.

GMS ISD Implementation:

- **Create a GMS Task Force on Innovation**
- **Organize GMS Innovation Forums**
- **Administer training and capacity building**
- **Create a GMS Innovation Fund**
- **Partner and collaborate with the private sector**
- **Develop a monitoring and evaluation framework**

Capacity Building

To build the capabilities of policymakers and implementing agencies in devising and implementing innovation policies, the GMS Program will develop and administer

Capacity building. Participants of a training and capacity building for government officials by the Mekong Institute in Khon Kaen, Thailand, as part of the GMS East–West Economic Corridor organic vegetable value chains.

capacity-building programs. Complementing the innovation forums, these programs will cover innovation policy as well as specific issues relevant to the GMS, including the diffusion and adoption of technology and sectoral approaches to innovation.

Working with knowledge partners from across the subregion, the GMS ISD will help create an enabling environment for the private sector by building innovation capabilities. Given the wide range of available resources, an initial task will be convening relevant stakeholders (e.g., accelerators and incubators) to identify relevant resources and gaps.

Greater Mekong Subregion Innovation Fund

A GMS innovation fund will be created to finance the activities envisioned under the GMS ISD, including the regular innovation forums, capacity-building activities, monitoring and evaluation, and efforts to build networks of innovation actors.

In addition, the GMS Program will support efforts to identify funding mechanisms to support start-ups and SMEs in their innovation activities. This may include specific direct early stage and catalytic funding for individual firms, longer-term support for scaling-up innovative activities, technical support for start-ups and SMEs, and initiatives for broader knowledge exchange and peer-to-peer learning.

Partnerships and Private Sector Collaboration

Building partnerships between different stakeholders across the GMS is an important facilitator of innovation, particularly for start-ups and SMEs that have grown domestically but face hurdles in expanding their activities to other GMS countries. Intermediaries that include start-up associations, federations of industries, chambers of commerce, and innovation hubs such as incubators and accelerators can act as connectors between government, the private sector, and start-ups, creating links between industry players, potential customers, and additional investors. In some cases, these intermediaries provide other services, including workspaces, infrastructure, support services, and education support through workshops, seminars, and training sessions.

Strengthening networks and collaborations among innovation intermediaries is essential to overcoming systemic challenges in innovation ecosystems. Such partnerships can facilitate the dissemination of critical knowledge to help innovators navigate diverse market conditions and complex regulatory and legal frameworks, foster cross-hub learning and knowledge exchange, and unlock economies of scale through coordinated education initiatives, including joint workshops and training programs. The GMS ISD will facilitate peer-to-peer learning and enhance cross-border collaboration of these groups, to improve the environment for cross-border collaboration on innovation by the business sector as well as the expansion of innovative firms across borders. These activities will be led by the GMS Business Council, and may be supported by development partners operating in the GMS.

Policy and Regulatory Framework

While domestic regulatory frameworks are the responsibility of national governments, the GMS Program will assist in convening policymakers from across the subregion to simplify and harmonize the regulatory landscape, where possible. Interoperable systems and approaches encourage cross-border collaboration in innovation, increasing the diffusion and adoption of technologies, and facilitating the flow of innovative goods and services across the GMS.

In the digital realm, regulatory issues, including important ethical issues in the case of AI and other emerging technologies, currently hinder the ability to cooperate in these areas, limiting trade, investment, and data sharing. A further area of focus will be easing the legal and compliance burdens that start-ups and SMEs face when looking to expand across national borders.

Monitoring and Evaluation

A monitoring and evaluation framework that will measure progress and allow for an evaluation of the GMS ISD, including a

mid-term review in 2028, will be developed. The framework will have two components. The first will have a short- to medium-term focus and will incorporate indicators specific to the main activities that fall under the umbrella of the GMS ISD. The second will address the longer-term ambitions of the GMS ISD in developing the subregional innovation system, building nascent innovation capabilities, and enhancing national efforts through regional cooperation and collaboration on innovation.

The exact set of indicators will be developed by the GMS Innovation Task Force, but will cover both medium- and long-term objectives (Table 1).

Data Collection and Harmonization

Given the complex nature of the innovation process and the multitude of different actors, the data used in developing, implementing, and monitoring innovation policy will be critical. Cross-border innovation strategies will require common and comparable data on different aspects of the innovation process to allow for monitoring and evaluation. GMS countries do collect data on innovation performance, but these efforts are not aligned, coordinated, or comparable. The extent and ambition of data collection efforts also vary across the subregion. For a cross-border innovation system to be successful, countries need to cooperate and coordinate on data collection and analysis.

The GMS Program will support discussions on the development of common frameworks for data collection across the GMS. It will provide a forum for discussion on harmonization of data collection efforts, ethical issues, and rules and governance regarding data collection and sharing. It will help build technical capabilities and tools for collecting and analyzing data. Through its monitoring framework, the GMS Program will encourage the development of common and comparable indicators of innovation performance across the GMS. As a longer-term ambition, these efforts could lead to the development of a GMS Observatory for Science, Technology, and Innovation (STI) that would serve as a repository for STI data in the subregion and a source of policy analysis.

Table 1: Proposed Innovation Indicators

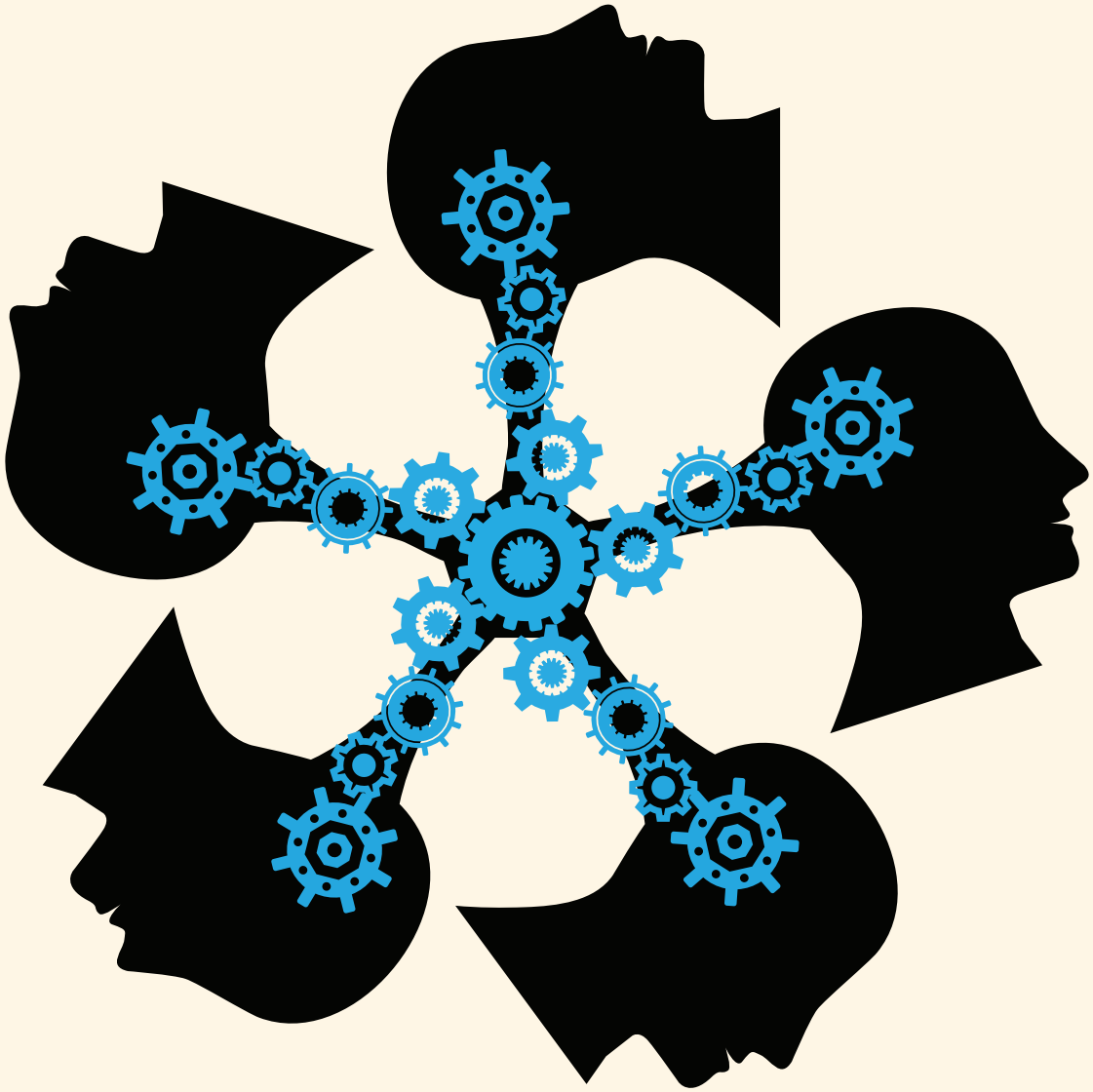
Targets and Indicators Specific to GMS ISD	Number of capacity-building activities and training events (and number of participants)
	Number of innovation forums and participants
	Percentage of GMS Program projects with innovation as a component
	Number of start-ups supported (including indicators related to inclusivity)
	Number of supported businesses adopting digital and/or green technologies
	Number of supported businesses expanding across GMS borders
Long-Term Targets and Indicators	Ranking of countries in the Global Innovation Index
	R&D spending as a percentage of GDP
	Number of domestic and foreign patent applications
	Number of patent applications by inventors in other GMS countries
	Number of patent applications with inventors from multiple GMS countries
	Firm-based innovation indicators on non-patented innovations not reliant on R&D
	Share of firms engaging in cross-border collaboration on innovation (firm-level surveys)

GDP = gross domestic product, GMS = Greater Mekong Subregion, R&D = research and development.

Source: Asian Development Bank.

Annexes

Codified and Tacit Knowledge. Both dimensions of knowledge support a cross-border innovation strategy aimed at fostering trade and foreign direct investment (FDI), enhancing infrastructure and regulatory frameworks, and building knowledge acquisition capabilities (photo by Shutterstock).



ANNEX 1

Rationale for a Regional Innovation Strategy for Development in the Greater Mekong Subregion

Innovation involves the creation and application of new knowledge and new ways of doing things (Box A1.1). It is most associated with technological innovation and involves the process of generating and applying new products and processes. Technological innovation drives industrial development, as in the rise of the textiles industry during the first Industrial Revolution, the invention of the combustion engine, advances in information and communication technology and digital technologies, and the current advances in advanced robotics, artificial intelligence and renewable energy technologies. Through such technological paradigm shifts, innovation has driven human progress.

Yet, innovation is a broader concept than technological innovation, and includes the application of new approaches in policy development, institutions, organizations, and public services. Innovation covers both the development and application of knowledge that is new to the world and the application of existing knowledge by actors positioned away from the global technological frontier. In other words, innovation involves the imitation, adaptation, and adoption of existing knowledge as well as the creation of new knowledge. This definition offers a broad view of innovation that includes incremental innovation, learning, and the acquisition of technology and knowledge away from the technological frontier. This definition has resonance in the Greater Mekong Subregion (GMS), where innovation capabilities are limited.

For both technologically advanced and less advanced GMS countries, innovation has the potential to improve economic outcomes and livelihoods, to achieve societal objectives, and to help solve regional challenges. Innovation is the major determinant of long-run economic growth and development, allowing developing countries to catch up with richer countries through technology diffusion and adaptation. At the firm level, innovation is a major driver of competitiveness and enhanced productivity. It is also a cause of disruptive change, creating both opportunities and challenges for countries at all levels of development. Innovation in green energy, for example, has provided humanity with an opportunity to shift energy production away from the use of fossil fuels and to mitigate climate change through carbon capture solutions.

Box A1.1: Defining Innovation

Innovation is a broad concept, which can be related to new products and services, new ideas or new processes, and new organizational modes. The Oslo Manual, produced by the Organisation for Economic Co-operation and Development (OECD) and Eurostat, provides a central guiding framework on understanding and measuring innovation, particularly in relation to collecting, reporting, and using data. Its fourth edition, released in 2018, provides the following general definition of innovation:

> An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).

In contrast to the concept of invention, innovation involves practical applications. It can refer to both an activity and an outcome of that activity. Increasingly, the OECD and other organizations recognize the importance of innovation that is not directly related to research and development but may be closely linked with the diffusion of existing technologies and practices across an economy, as well as the ability to exploit new technological combinations.

Source: OECD. 2018. *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*. 4 ed.

Innovation is not an isolated activity. It takes place within a broad system (Box A1.2), highlighting the importance of serendipity, of the links between different actors within and across systems, and of various feedback loops that exist among them. The actors in the innovation system are varied and include businesses (large firms, small and medium-sized enterprises [SMEs], and multinational enterprises), the government, and the science system (universities and research centers, among others). These are supported by global innovation networks and communities of practice and consumers. Potential bottlenecks in the innovation process include weak skills, financing, and links, among many others. In the GMS, innovation systems are, in most cases, in their early stages. While many of the actors and components exist in some form in GMS countries, the connections between them are often missing or fragmented. The development of these links, locally and internationally, is an important component of the Greater Mekong Subregion Innovation Strategy for Development 2030 (GMS ISD).

Innovation policies are governments' efforts to generate, use, and diffuse new knowledge. They are often a component of a broader package of policies linked to science, technology, and competition, sometimes bundled together under the heading of industrial policy.

Box A1.2: Innovation Systems

In developing an innovation strategy, it is important to think of innovation in a broad sense and not just focus on research and development. This is because of the systemic nature of innovation, with systems of innovation appearing at different scales.

The concept of the National Innovation System (NIS) stems from evolutionary economics (e.g., Freeman 1987; Nelson 1993) and argues that the performance of national economies cannot be analyzed only in terms of the strategies and performance of firms. There are other factors and actors that play vital roles in favoring the generation and diffusion of knowledge, including: interorganizational networks, financial and legal institutions, technical agencies and science research infrastructures, education and training systems, government bodies and governance structures, and innovation policies. Laws, rules, social norms, and routines together shape the interactions among different organizations, and thereby both provide incentives for innovation but also create obstacles to innovation. The aim of the NIS framework is to capture the mechanisms of learning, innovation, and competence and capabilities building, and provides a holistic approach to developing innovation strategies.

While the innovation systems framework focused initially on the national level, NISs are not simply the sum of subnational or sectoral systems. To capture the role of proximity and the localized nature of interactions, a regional (i.e., subnational) innovation system framework emerged (Asheim and Gertler 2004). This approach emphasizes a bottom–up view of localized communication patterns related to innovation processes, localized invention and learning patterns, localized knowledge sharing, localized search and scanning procedures relating to innovation and technology, localized network integration and alignment of governance modes, and historical path dependence of innovation processes (Howells 1999, Iammarino 2005).

Systems of innovation are also relevant at the sectoral level, with such systems described as "a set of new and established products for specific uses and the set of agents carrying out market and non-market interactions for the creation, production and sale of those products" (Malerba 2002, p. 248). Like the NIS concept, this approach emphasizes the importance of interactions among actors and the role of institutions in shaping such interactions, but highlights sector-specific knowledge bases, technologies, inputs, and demand.

The importance of transnational innovation systems (TNIS) has also been identified (Trippl 2010). The potential benefits of developing TNIS are large, since such systems encourage the exploitation of complementarities between partners, allowing for the emergence of synergies, and, by enlarging consumer, labor, and factor markets, encouraging competition, extending the division of labor, and increasing specialization. To be successful, however, the cognitive proximity between the different parts of the system needs to be not so large as to limit learning due to having very different knowledge bases, but also not so small that the opportunities for learning are limited due to similarity (Nooteboom 2000).

continued on next page

Box A1.2 *continued*

These different levels of aggregation call for a complementary approach to innovation strategy that considers the subnational and sectoral innovation systems and some mediation between these and national level systems (Lundvall et al. 2011). In developing a transnational innovation system an additional layer of complexity is added through the need to account for the different capabilities of the partner countries.

Sources:

B. Asheim and M. Gertler. 2004. The Geography of Innovation: Regional Innovation Systems. In J. Fagerberg, D. Mowery, and R. Nelson, eds. *The Oxford Handbook of Innovation.* Oxford University Press. pp. 291–317.

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B. Nooteboom. 2000. *Learning and Innovation in Organizations and Economies*. Oxford University Press.

M. Trippl. 2010. Developing Cross-Border Regional Innovation Systems: Key Factors and Challenges. *Tijdschrift voor economische en sociale geografie*. 101(2). pp. 150–160.

Given the importance of innovation for sustainable socioeconomic development, it is unsurprising that most countries have innovation at the center of their industrial and development policies.

Policies are needed to coordinate and guide the diverse activities that take place within an innovation system. Policies on education and skill formation and upgrading, research and development, funding, intellectual property rights, regulations, and market access need to be coordinated. Research institutes, entrepreneurs, and finance institutions need to be created, connected, and coordinated. By considering these different dimensions from a holistic perspective, a national innovation policy can provide for a more coherent and effective innovation system. A cross-border approach to innovation offers further benefits allowing for the sharing and diffusion of technology and knowledge across borders (Box A1.3).

The GMS ISD will assist in developing the nascent National Innovation Systems in some GMS countries, further encouraging cross-border collaboration, and laying the foundations for a subregional innovation system. A subregional innovation system in the GMS could leverage the activities of the GMS Program to solve common regional challenges, maximize the potential and efficiency of innovation in the subregion, and build cross-border networks and interactions to improve the diffusion of knowledge within and across borders. If these are achieved, investment and trade in the subregion will increase and specialization and the development of localized value chains will be encouraged. The ultimate goal is to foster economic growth and competitiveness.

Box A1.3: Codified and Tacit Knowledge as Rationale for a Cross-Border Innovation Strategy

The nature of knowledge provides an important rationale for developing a subregional innovation strategy and efforts to develop the subnational innovation system. Knowledge produced through the innovation process can be codified or tacit, with both providing an important rationale for developing a cross-border innovation system.

Codified knowledge is often embodied in goods and services. Access to these goods and services through the diffusion of technology is crucial for countries located far from the technological frontier if they are to benefit from innovation. Attracting foreign direct investment (FDI) (Thorbecke and Salike, 2011) and participating in global value chains (De Marchi et al. 2018) provides a significant boost to innovation capacity and, more generally, economic development. Trade, FDI, and the creation of forward and backward global value chain linkages are crucial mechanisms for technology transfer and knowledge diffusion (Crescenzi and Harman, 2023). Greater Mekong Subregion (GMS) countries increasingly have opportunities to facilitate knowledge diffusion by developing such links, with trade in intermediate input and services much more regionalized within the GMS area than trade in final goods. Intra-area internationalization through FDI is very important: the growth of emerging economies' multinational enterprises in recent years has shown some of these governments actively promoting outward FDI at the same time as implementing policies for FDI attractiveness and export growth (Crescenzi and Harman, 2023).

In contrast, the presence of tacit knowledge means that innovation and technology cannot be easily traded or exchanged. The return on innovation to a firm may well be mainly a return on its creation of tacit capability, a process supported by, but not reducible to, the generation of potentially new public knowledge. Knowledge can also be at the same time both "sticky" within the organization or firm boundaries, while also being "leaky" or mobile, generating outflows of knowledge in the environment external to the firm. This property of innovation provides a strong rationale for cross-border cooperation in innovation activities, with cooperation potentially enhancing the scale and avoiding the replication of innovation, while spreading the gains of innovation among cooperating partners more quickly.

These two different dimensions of knowledge further support an innovation strategy focused on encouraging increased trade and FDI within the GMS and with other partners, developing the infrastructure and regulatory frameworks to encourage the circulation of knowledge, and building capabilities for knowledge acquisition.

Sources:

R. Crescenzi and O. Harman. 2023. Public Policy Considerations for Climbing Global Value Chains in Asia. The International Growth Centre. https://www.theigc.org/blogs/public-policy-considerations-climbing-global-value-chains-asia.

V. De Marchi, E. Giuliani, and R. Rabellotti. 2018. Do Global Value Chains Offer Developing Countries Learning and Innovation Opportunities? *The European Journal of Development Research*. 30. pp. 389–407.

W. Thorbecke and N. Salike. 2011. Understanding Foreign Direct Investment in East Asia. *ADBI Working Paper 290*. Asian Development Bank Institute.

E. Von Hippel. 1994. "Sticky Information" and the Locus of Problem Solving: Implications for Innovation. *Management Science*. 40(4). pp. 429–439.

Diffusion of knowledge and technology. A laboratory worker at the ADB-financed De Heus Sustainable and Inclusive Feed Supply Project in Cambodia. Collaboration among GMS countries is essential for spreading the gains of innovation quickly.

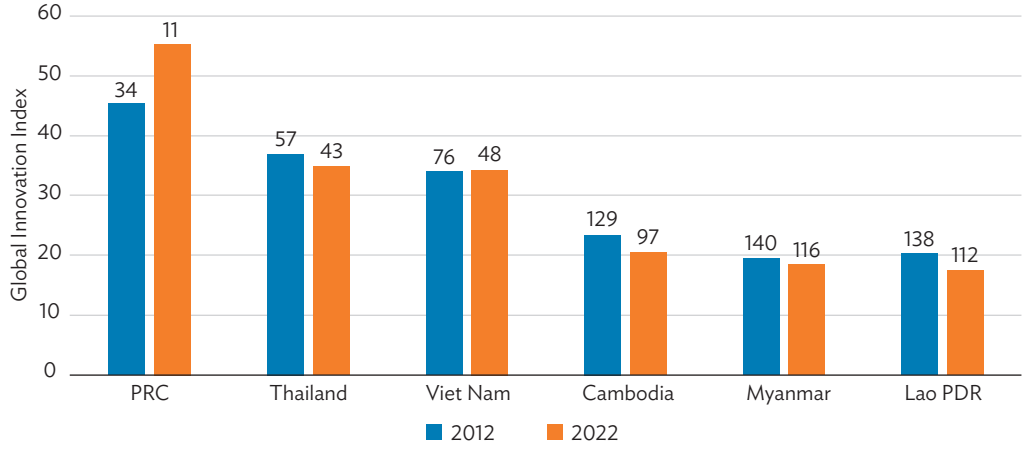
ANNEX 2

Situational Analysis

Greater Mekong Subregion (GMS) countries differ in their levels of development and in their resources and capabilities for innovation. In 2022, per capita income in some countries of the GMS was more than five times higher than in others. Differences are also pronounced for indicators of innovation, evident in the Global Innovation Index for 2022 (Figure A2.1). The two GMS provinces from the People's Republic of China (PRC)—Yunnan Province (43), and Guangxi Zhuang Autonomous Region (49)—had scores that placed them above Thailand and Viet Nam, according to this index of innovation capabilities. These differences in innovation capabilities create challenges in developing an innovation strategy to fit all needs, but also create opportunities for less developed countries to learn from the leading GMS countries.

GMS countries rely heavily on international trade, with Cambodia, Thailand, and Viet Nam having trade-to-gross domestic product ratios above 100%. The major destination for exports is Asia, apart from Cambodia, whose exports are mainly directed to North American markets. The importance of intra-GMS trade differs widely. More than three-quarters of merchandise exports from the Lao People's Democratic Republic (Lao PDR) are destined for other GMS countries, while the equivalent shares are about 50% for Myanmar, 20% for other subregional countries, and just 6% in the PRC, which also has a much higher value of exports than the rest. The PRC, Thailand, and Viet Nam are the key export destinations within the GMS, with Cambodia being an important destination for the Lao PDR, Thailand, and Viet Nam; and the Lao PDR for Thailand. Within the PRC, Yunnan's top export destinations do not include GMS countries, while for Guangxi Zhuang Autonomous Region, Thailand and Viet Nam are among its top export destinations. With trade an important conduit for technology transfer, these differences emphasize the importance of intra-GMS knowledge flows for some GMS countries, with others more able to benefit from global knowledge sources.

Figure A2.1: Global Innovation Index, 2012 and 2022



PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.

Note: Numbers reported above the bars refer to country rankings for the year. Data for Myanmar are for 2014 and 2022.

Source: World Intellectual Property Organization.

Box A2.1: Economic Complexity and Exports in the Greater Mekong Subregion

Economic complexity is a recent approach to measuring a country's capabilities using data on products that countries export successfully. By adopting this approach, the structure of exports becomes relevant when considering the capabilities of a country.

The economic complexity index (calculated using data from the Observatory for Economic Complexity [OEC]), shows an upward trend in complexity across all Greater Mekong Subregion (GMS) countries. The People's Republic of China (PRC) and Thailand have relatively high complexity levels, while Cambodia, the Lao People's Democratic Republic (Lao PDR), and Myanmar have much lower levels, among the lowest in the world during the mid-1990s to mid-2000s. These countries have shown signs of improvement, with the 2022 rankings being Cambodia (92), the Lao PDR (100), and Myanmar (102) out of 133 countries. These contrast with a ranking of 22 and 29 for the PRC and Thailand, respectively. Viet Nam lies between these two groups of GMS countries with a ranking of 55. In the 1990s, its complexity level was close to Cambodia, the Lao PDR, and Myanmar, but it saw a significant increase over time, although this improvement was not strong enough for Viet Nam to catch up with the PRC and Thailand.

Within the PRC, we can look at subnational economic complexity, which is also built from exports but takes the rest of the country as comparative reference, rather than the rest of the world. According to the OEC calculations done for 31 provinces in the PRC, the Guangxi Zhuang Autonomous Region ranked 12 in 2023, while Yunnan Province ranked 31, making it the least complex province within the PRC.

In 2022, two GMS groups can be identified:

- The PRC, Thailand, and Viet Nam all have "machines" as their top product category, many of which are related to information technology and complementary products. This is followed by products within the textiles and footwear groups, and metals and other commodities.
- In Cambodia and Myanmar, the dominant category is textiles and footwear, followed by vegetable products, while in the Lao PDR exports are concentrated on minerals, metals and other commodities, and vegetable products.
- Within the PRC, the top exports for Guangxi Zhuang Autonomous Region and Yunnan Province do not differ greatly from the PRC as a whole in terms of the dominant categories, though Yunnan appears to be more strongly specialized in commodities.

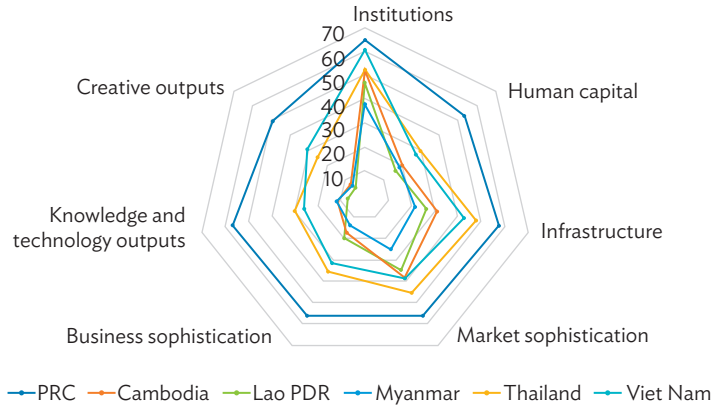
Source: GMS Secretariat.

Despite considerable differences in their innovation capabilities and the extent of their internationalization, GMS countries share some competitive advantages and industrial structures, as well as common weaknesses regarding the development of domestic capabilities. The components of the Global Innovation Index indicate that GMS countries tend to perform better in terms of their institutions and market sophistication, with much wider differences between GMS countries observed for creative outputs, knowledge and technology outputs, and business sophistication (Figure A2.2). Except for the PRC, human capital seems to be a weakness for all other GMS countries.

Strengthening capabilities through regional collaboration can reinforce national and regional systems, and move the GMS toward a subregional supranational, or transnational, system of innovation.

The existence, extent, and ambition of innovation strategies in GMS countries also differ in terms of their priorities, objectives, and approaches. Despite this, there are areas of commonality in terms of focus, with all GMS countries having the digitalization and green transitions as priorities. GMS countries have endorsed the GMS-2030, demonstrating their shared ambition to find innovative solutions to regional challenges and to build the infrastructure needed to improve connectivity and cooperation.

Figure A2.2: Components of the Global Innovation Index, 2022



PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.
Source: World Intellectual Property Organization.

High-skilled human capital. A teacher instructs students participating in the Strengthening Technical Vocational Education and Training Project in the Lao PDR. Investing in human capital is essential for innovation.

Although all GMS countries have designed and applied innovation policies for economic and social development, they still face significant constraints in governance, resources committed, and outputs. These include:

1. All GMS countries have science and technology institutions, at least at the national level; yet such institutions often do not have sufficient or adequate economic and human resources to coordinate and implement far-reaching policies. They also often lack a clear governance framework for innovation support and management, the institutional capacity to mobilize and manage resources from the national budgets, and policies to coordinate the activities of other stakeholders involved.

2. GMS countries possess, to different extents, ineffective or incomplete systems of innovation. Not all components of the system can be found everywhere, and those present often have significant weaknesses in terms of their quality and quantity. For example, there are universities and research centers across the GMS, but they are not always strong enough to spur competitive research and innovation and they lack highly skilled human capital. Similarly, there are government bodies in charge of designing and implementing public policies, but they have financial and human resources weaknesses in many cases. The private sector may, in some GMS countries, display a limited perception of innovation trends and opportunities. Most importantly, interactions and networking among the components of the innovation systems, and across them, are weak, and sometimes nonexistent.

3. Public and private investments in science, technology, and innovation (STI) are limited. Research and development expenditure as a percentage of gross domestic product is minimal in some GMS countries, as is their performance against some innovation output indicators, such as the number of patents and scientific publications. To monitor trends and anticipate opportunities and threats, it is essential to consider innovation beyond its technological nature, and to maximize development potential from incremental innovations, upgrading provided by new general-purpose technologies (GPTs)—both digital and renewable energy are GPTs—backward linkages between multinational enterprises and local firms, and knowledge sharing on specific sectors of shared interests across the subregion.

Table A2: Strengths, Weaknesses, Opportunities, and Threats of the Subregional Innovation System

STRENGTHS	WEAKNESSES
• While the Greater Mekong Subregion (GMS) countries are at different stages in the process, they all recognize the importance of innovation and have started making efforts to improve their innovation performance. As a result, all have made some commitment toward public spending in research and development (R&D). • Several GMS governments are actively improving their educational systems and, in some countries, more emphasis is being placed on science, technology, engineering, and mathematics subjects. • Most GMS countries have a national innovation strategy. All have used innovation policy tools, such as economic corridors, tax incentives, development of research institutions, technology parks, special economic zones, among others. • All GMS countries welcome foreign direct investment (FDI) and tend to be attractive destinations for investments by multinational enterprises. Critical areas for the green transition, such as renewable energy, may offer opportunities for multisectoral investments (Box A2.2). • The GMS countries are well placed geographically to trade, invest across borders, and consolidate their links within regional global value chains and with the rest of Southeast Asia.	• All GMS countries lack skills in science and technology and related fields, to varying degrees. Education levels in the labor force need to be improved. In some GMS countries, there is a shortage of skilled labor. • The links between universities and industry are weak or barely present in some GMS countries. This is due, in some cases, to a lack of research capabilities in national universities. When such links exist, they are largely focused on the provision of human capital rather than on research. Some GMS countries have very few researchers. • Some GMS countries still lack strong science and technology infrastructure. • Despite advancements in innovation and related policies, some countries lack coordination across different ministries and agencies, with different actors working in silos, hindering the effectiveness of different initiatives. • R&D spending and other innovation-related funding are still below minimum levels. • There is a lack of technological adoption and modernization in some sectors (e.g., agriculture). Technological and knowledge spillovers from multinational enterprises and inward FDI to domestic firms have been very limited, even in GMS countries with high FDI. The extent of active internationalization through outward FDI is at different stages in the GMS countries, with some still at a very early stage.
OPPORTUNITIES	**THREATS**
• Significant scope exists for improving business innovation and digitalization across the GMS. • GMS countries can leverage their strategic location and existing infrastructure to attract further investment. • The visible increase in FDI in renewable energy and other critical sectors within the GMS and from outside the area signals important opportunities to leverage development in line with the Sustainable Development Goals and associated capabilities for diversification toward higher value-added activities. • Some GMS countries are exporters of critical raw materials that will be crucially important in the digital and green transitions. • GMS countries can adopt and diffuse digital and other new technologies to increase productivity. • GMS countries can strengthen university research through international links. These may enhance local R&D and technology capacity through knowledge exchanges. • There is potential to establish further collaboration, including exchanges of researchers, and to promote capacity building across GMS countries. • Exchanges between schools and universities could promote and improve education across GMS countries.	• The global slowdown in growth and trade, combined with rapid changes in technologies. • Environmental degradation, climate change, and the rise of automation. • Intense external competition, for example through integration processes in the context of the Association of Southeast Asian Nations and, more broadly, a failure to prepare for changes in international competition. • Rapid technological advances by overseas companies may render existing local industries and skills obsolete, leading to job displacement and economic instability. • International relations and geopolitical risks and conflict, as well as potential trade restrictions.

Source: GMS Secretariat.

4. Most of the GMS countries do not have adequate measurement and testing services for quality standards, although these are crucial for fostering innovations and securing their reliability and comparability. In addition, to develop capacities to improve the screening, selection, and multilevel governance of STI, sector- and place-specific indicators and measures need to be developed. This entails, as a first step in designing knowledge-based policymaking, creating an integrated information base that can be used to monitor the potential features and evolution of the international integration of the GMS countries, within the GMS but also more broadly.

To identify the main opportunities for a cross-border innovation strategy in the GMS, the strengths and weaknesses of the subregional innovation system have been examined, identifying areas of commonality that provide the focus for the GMS ISD.

Box A2.2: Greenfield Foreign Direct Investment in Cambodia, the Lao People's Democratic Republic, and Viet Nam

Using data from fDiMarkets, a *Financial Times* database that monitors cross-border greenfield investments, Iammarino et al. (2024) investigated the position and trajectory of Cambodia's greenfield foreign direct investment (FDI) flows, comparing them with those in the Lao People's Democratic Republic (Lao PDR) and Viet Nam. The trends for all three countries mirror each other in terms of inward FDI, although the magnitude of FDI in Viet Nam is on average 10 times greater than for the other two countries.

In sectoral terms, "alternative/renewable energy" is in the top three FDI recipients in all three countries, while "real estate and metals" features in the top five for all three. Although coal, oil and natural gas, financial services, and transportation and warehousing are also important common sectors, Viet Nam receives a much bigger value of inward FDI in higher value-added manufacturing sectors such as electronic components and chemicals. As in Viet Nam, textiles are an important sector in Cambodia—as expected, given the labor-intensive nature of the sector—in terms of the estimated number of jobs generated over time. The Lao PDR is more attractive for FDI in hotels and tourism and rubber.

Turning to FDI functions, all three countries rank highest in production, with above 70% of total FDI value, with Viet Nam registering almost 90% over the 2 decades. For Cambodia and Viet Nam, production is followed by sales, while in the Lao PDR, "headquarters" is ranked second. Unsurprisingly, FDI in research and development (R&D) and innovation functions ranks last in all three countries: Cambodia (0.2%), Viet Nam (1.1%), and the Lao PDR (0.4%). R&D spillovers from FDI will materialize only when Greater Mekong Subregion (GMS) national and transnational science, technology, and innovation systems are stronger.

The Association of Southeast Asian Nations is an important source of FDI. In Cambodia, major investors are from Malaysia, the People's Republic of China (PRC), Japan, Singapore, and Thailand; in Viet Nam, the main investors come from the Republic of Korea; Japan; the United States; Malaysia; and Taipei,China; for the Lao PDR, FDI originates from Thailand, Viet Nam, the PRC, Malaysia, and Japan. Overall, investors from the PRC seem to be more active in Cambodia and the Lao PDR than in Viet Nam. More generally, Cambodia and the Lao PDR rely heavily on GMS investors, including Thailand and Viet Nam. Overall, data show strong FDI integration among GMS economies, corroborating the vital importance of FDI and global value chains within macro-regions and their fundamental role in spurring innovation creation and diffusions through international linkages.

Finally, the extent of active internationalization through outward FDI is still practically zero for the Lao PDR, and in its infancy for Cambodia, where the few outward FDI initiatives target the Lao PDR and Myanmar, as well as Ethiopia. On the other hand, in addition to the recent surge of investments toward the United States and the Russian Federation, significant investments from investors from Viet Nam have been directed at Cambodia, Myanmar, and the Lao PDR, highlighting the relevance of regional integration and the potential for further diversification and learning.

Source:
S. Iammarino, S. Muth, and K. Nith. 2024. 20 Years of FDI in Cambodia: Towards Upper Middle-Income Status and Beyond. Cambodia Development Resource Institute (CDRI).

The Greater Mekong Subregion Innovation Strategy for Development 2030

The Greater Mekong Subregion Innovation Strategy for Development 2030 (GMS ISD) aims to accelerate progress toward achieving the ambitions of the Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030. The GMS ISD focuses on unifying the subregion's innovation direction, facilitating policy dialogue, building stakeholder skills, strengthening networks, promoting knowledge diffusion, and supporting entrepreneurship. The strategy includes approaches to digitalization, the green transition, and connectivity to integrate the subregion into high value-added regional and global value chains. The GMS ISD also presents approaches toward innovation in sectors of the Greater Mekong Subregion Program and proposes tools for effective implementation of the strategy. Ultimately, the GMS ISD seeks to harness innovation for sustainable growth, improved connectivity, and enhanced well-being, promoting inclusive and collaborative solutions to regional challenges.

About the Greater Mekong Subregion Economic Cooperation Program

The Greater Mekong Subregion is made up of Cambodia, the People's Republic of China (specifically Yunnan Province and Guangxi Zhuang Autonomous Region), the Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. In 1992, with assistance from the Asian Development Bank and building on their shared histories and cultures, the six countries of the GMS launched a program of subregional economic cooperation—the GMS Program—to enhance their economic relations. The GMS Program covers the following priority sectors: agriculture, energy, environment, health cooperation, tourism, transport, trade and investment, and urban development.

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