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APEC Think Tank Cooperation on STI Strategy Study Report

APEC Policy Partnership for Science, Technology and Innovation

September 2023

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APEC Project: PPSTI 05 2021

Produced by

China Association for International Science and Technology Cooperation

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APEC#223-PP-01.6

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Preface

This Study Report is one of the outputs of the APEC PPSTI funding project "Strengthen APEC Think Tank Cooperation on STI Strategy to Enhance Recovery Featured with Innovation, Inclusion and Sustainability" (PPSTI 05 2021), which is applied by the China Association for International Science and Technology Cooperation, and co-sponsored by Chile; Indonesia; Republic of Korea; Papua New Guinea; and Peru.

The project was applied and designed to share experience on existing think tanks in the fields of specific science and technology and to explore consensus and policy recommendations about think tank mechanisms on the strategic stage. In order to achieve these purposes, the Project Overseer team organized two workshops and invited more than 50 experts representing member economies in the APEC region.

Due to global shifts at that time, such as COVID-19 and relevant conditions, the workshops were organized online instead of physical activities. However, well-known and official think tanks from member economies are invited to attend and deliver their professional experience. Most representatives introduced their practical cases, and some of them gave specific ideas on regional STI collaboration. The main task of this series of projects is to establish an effective system of science technology and innovation (STI) strategic level guidance, providing policy recommendations to member economies, as well as those think tank institutions on specific technological fields like information, biomedical, climate technologies, and innovative theories such as fintech and digital economy.

For better consensus in the beginning, the concept that "think tanks conduct research and provide advice and advocacy in a wide range of topics such as social policy, domestic defense and military, the economy, culture, and emerging technology" could be one of the accepted understandings of most stakeholders. The PO team would like to express our thanks to the APEC Secretariat and all focal points of member economies. We are going to follow a long-term working plan so that this project could raise benefits to APEC PPSTI and the whole region.

PPSTI 05 2021

China Association for International Science and Technology Cooperation

Part I Significant Think Tanks on STI and Economics: Backgrounds and Ideas

The project workshops were organized to gather information on typical think tank mechanisms, such as non-profit organizations, corporations, governmental departments, and research institutions. This part summarizes their background introduction and ideas on regional STI cooperation.

1.1 Think Tank Tasks of International Organizations

1.1.1 Asian Development Bank (ADB)

The Asian Development Bank (ADB) was founded in 1966 with the goal of eradicating poverty in the region. The Asian Development Bank started its operations in Western Asia (the Caucasus region) and Central Asia in the 2000s and soon became one of the region's leading investors. The Bank provides both sovereign and private sector loans in various areas, such as energy, environmental infrastructure, transport, urban development and agriculture. The Asian Development Bank (ADB) envisions a prosperous, inclusive, resilient, and sustainable Asia and the Pacific while sustaining its efforts to eradicate extreme poverty in the region.

In order to catch these purposes, ADB assists its members, and partners, by providing loans, technical assistance, grants, and equity investments to promote social and economic development. ADB maximizes the development impact of its assistance by facilitating policy dialogues, providing advisory services, and mobilizing financial resources through co-financing operations that tap official, commercial, and export credit sources. ADB purposed to enhance technology and research collaboration in the APEC region, so they established their own network ADB-Asian Think Tank Network and delivered several objectives: To enhance systematic knowledge sharing among member think tanks; to strengthen capacity to generate knowledge or provide policy advice on its domain; to raise the region's voice in the international arena on issues related to economic growth and inclusive development.

1.2 Government-Founded Think Tanks Founded by Governmental Systems

1.2.1 Australian Academy of Science (AAS)

The Australian Academy of Science (AAS) provides independent, authoritative and influential scientific advice, promotes international scientific engagement, builds public awareness and understanding of science, and champions, celebrates and

supports excellence in Australian science. At the workshop, AAS shared their mission and purposes to explore STI collaboration by studying the impacts of COVID-19 and women in the STEM workforce in the APEC region.

According to the findings of AAS, in Asia-Pacific and beyond, the pandemic has led to the rise of common social changes across all economies and as such global solutions are required, different parts of the region share different perspectives of capacity in their economy to respond and their access to infrastructure, regional strategies and collaboration are needed. AAS calling action is to drive ongoing commitment and action to advance the APEC Women in STEM Principles and Actions, recommit as economies and communities to the UN Beijing Declaration 1995 and SDGs and track progress on gender equity aspired to in these frameworks, to create opportunities to share best practice among economies in the region, including consideration of the International Science Council's initiative to address the gender gap in science and mathematics.

1.2.2 Science and Technology Policy Institute (STEPI)

Since its establishment in 1987, STEPI has played a vital role in providing technical expertise to the economy in different social and economic affairs related to science and technology activities, based on the vast R&D capabilities that have been persistently cultivated for decades. Through its knowledge management and active interactions with the government and industries, STEPI has devoted efforts to advance Korea's domestic competitiveness, especially in science and technology.

STEPI pointed out that there are many special features in APEC, the most important one is that there is a lot of diversity in the APEC region, which requires member economies to work together on a knowledge basis. Regarding climate change, economic development and environmental governance there are different approaches and different contexts in each economy across the APEC region. Each policymaker and each economy have a different focus and different ideas for policymaking.

1.2.3 China Science and Technology Exchange Center (CSTEC)

CSTEC was established in 1982 with the approval of the State Council of the PRC. It's a domestic legal entity offering professional services for international S&T exchanges and cooperation and an institution affiliated with the Ministry of Science

and Technology (MOST), PRC. It promotes scientific and socioeconomic progress and improves the friendship between China and economies across the world.

CSTEC introduced their Belt and Road Announcement and the Humanities Exchange, which is the main initiative of the Chinese government in both 2017 in 2019, including STI cooperation project management, joint laboratory, technology commercialization, and STI parks. CSTEC has many innovative resource platforms, such as the International Innovation and Entrepreneurship Competition, and the Innovation Investment Matchmaking Conference. CSTEC noticed international STI cooperation is accurate, exquisite and precise, and they find that technology is more urgent and important than ever with corporations in the field of science and technology.

1.3 Professional Think Tank Institutions

1.3.1 The RAND Corporation

RAND is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. As a nonpartisan organization, RAND is widely respected for operating independently of political and commercial pressures.

RAND announced that the S&T innovation eco-system requires a network of government, industry, academia and policy research, with well-defined roles. As a professional think tank corporation, it pointed out the weaknesses that can arise from inadequate policy research. And the US CHIPS and Science Act shows a better balance between academic research and commercialization.

1.3.2 ZGC Global High-level Think Tank Alliance

The ZGC Global High-level Think Tank Alliance is committed to building a community with a shared future for mankind with global wisdom and builds an exchange platform to conduct cooperative research and serve social development. It promotes cultural exchanges and mutual trust among civilizations and boosts collaborative innovation of global think tanks. It has enrolled 42 member units in 8 economies, including China; Japan; Korea; Singapore; and the United States. It brings together 8 Nobel Laureates and 10 Academicians and nearly 100 heads of international organizations and chief, experts of global high-level think tanks.

The Alliance gave their opinion that all economies should endeavor to build a new future-oriented partnership. S&T cooperation and cultural exchanges should be strengthened. Interactions among think tanks at home and abroad should be promoted. Modernize cooperation mechanisms, diversify cooperation fields and lead advanced topics. Efforts should also be made to strengthen the transparency of members' policies. Members should be guided to pay attention to new global issues such as economic and trade recovery, digital economy and smart cities in the post-pandemic period for regional and international sustainable development.

Part II Think Tanks in APEC Member Economies

2.1 Chile

2.1.1 Sustainability in Food Exports Challenges for Food Export Policies and Strategies

1) The challenges of the Voluntary Sustainable Standards (VSS) for the development of the food exporter

Standards affect actors all along supply chains. Company-specific codes, voluntary standards, and mandatory or regulatory standards are the 3 main types of standards that may affect international trade transactions. Consumers, corporations, and some governments have been putting increasing pressure to complement the existing regulatory or mandatory standards. Presently, myriad different standards exist in the context of international business, at both regulatory and voluntary levels.

2) The use of International Trade Center (ITC) tools

In considering, analyzing and facilitating VSS decisions for the purposes of targeting export markets in the case of specific products with export potential originating from an economy of origin. Based on the adopted methodology and criteria, 13 voluntary standards were obtained for the case of oats. With by, the total number of standards that meet all the requirements is 10. The identified standards were classified into 3 pillars “Environment”, “Social” and “Quality” and 19 sub-categories provided by the ITC tool. Policymakers need to provide advice to exporters on points to consider when making decisions regarding which VSS to focus on if they wish to enter a certain market.

3) Business and management research trends of sustainability assessment in the food sector

The research reveals that companies need to be actively engaged with their stakeholders and pay special attention to consumer patterns and perceptions. The analyses uncovered an important trend in research related to “performance”, wherein the concern for processes is evident in terms of sustainable efficiency and enhancing sustainability performances.

4) Latin America's export trade prospect of agricultural products to China

The trade relationship between China and Latin America in agricultural products is getting closer and closer. Latin America has accounted for 20 per cent of China's agricultural product trade. In total trade, there are more imports of China from Latin America. Trade with Latin America in agricultural products accounts for the majority of China's trade deficit in agricultural trade. Plans could be made for cooperation according to local conditions. Latin America should improve the quality control of exported agricultural products. China and Latin America should promote regional integration and strengthen technology cooperation in the agricultural industry.

2.2 People's Republic of China

2.2.1 Using Technology Diplomacy to Support STI Think Tank Collaboration

1) Introduction of the Committee of experts on science and technology diplomacy

The Committee of Experts on Science and Technology Diplomacy was established in January 2022, led by the significant principle of building a community of human destiny, combining the wisdom of scholars and experts, aiming at accelerating the adjustment of the practice level and continuously creating a new situation for science and technology diplomacy. "Making science and technology work for diplomacy, making diplomacy work for science and technology." is the goal of the Committee.

The Committee of Experts on Science and Technology Diplomacy has set up 10 branch committees based on the logic of economies and fields respectively. Based on the economies, and according to the characteristics of their domestic conditions and cooperation levels with China, the expert committees of China-Japan, China-Israel, China-Italy, and China-Germany have been established. In addition, six expert committees in the fields of life science, information technology, material science, earth science, energy environment, agriculture, and advanced manufacturing have been set up to provide in-depth services to various institutions and platforms for international science and technology cooperation. Through a three-step process of researching economy-specific industries, defining cooperation strategies, and making project lists, the committee will provide guidance for accurate international science and technology cooperation.

2) Opportunities and prospects for the development of think tanks

On the role of STI think tanks, Jin summarized the following four major points: first, STI think tanks need to be able to anticipate situations and take the lead in driving

policy analysis, providing solutions and maximizing outputs in the face of uncertainty. Second, STI think tanks need to be able to promote collaboration, be agents of globalization, facilitate transnational research collaboration, and play an important role in addressing public issue challenges. Third, STI think tanks need to be able to play an enhanced communication role, facilitating communication and interaction between different stakeholders, including scientists, entrepreneurs, legal professionals, government personnel and others. Fourth, STI think tanks need to play a creative role, stimulating the creative inspiration and imagination of science and technology practitioners, and strengthening research institutions and policy connections to promote science and technology innovation.

On the form of STI think tanks, Jin believes that an STI think tank can exist in the form of an organization, institution, or consortium, and it is a collection of expert intellect. An STI think tank needs to focus on science and technology policy, macro-economic development or focus on a specific technology field or industry development direction and key issues at a strategic level, and provide information, suggestions and recommendations on STI development.

The output of STI think tanks should include: views, publications and activities. STI think tanks are expected to develop strategic perspectives on global STI development and cooperation and publish their results in the form of journal articles, academic papers, publications, policy recommendations and monographs, as well as organize regular high-impact platforms or networking events, and conduct high-level dialogues among opinion leaders and influencers.

Relying on the APEC framework, it will use subjects, projects, platforms and activities as tools to carry out the practice of private science and technology diplomacy, leading the development of civil science and technology diplomacy, and exploring models and methods to promote civil science and technology cooperation and enrich the content of science and technology diplomacy under the framework of the overall domestic science and technology diplomacy deployment and agreement on science and technology cooperation between economies, so as to achieve a useful complement to formal science and technology diplomacy.

Under the APEC cooperation system, it will continue enriching the content and form of international science and technology cooperation, allowing the achievements of

China's science and technology development to benefit the world more widely, allowing more elements of world science and technology innovation to integrate into China's science and technology innovation system, joining hands to create a global science and technology innovation ecosystem, and practicing and practicing a community of shared future for humanity.

2.2.2 Public Participation and Social Responsibility of Science and Technology Think Tanks in the New Ara: Practice & Thinking of National Academy of Innovation Strategy, CAST

1) Establishment of Science & Technology Think Tanks (STTTs) conforming to the development of the era

China Association for Science and Technology (CAST) is China's largest non-governmental organization in the field of science and technology. A home for scientists and technicians, a bridge between the government and the scientific and technical community in China, and an important force to promote the development of science and technology.

National Academy of Innovation Strategy (NAIS) insists on the strategic positioning of "Global Vision, Height of the Times, Historical Depth and S&T Frontier", and upholds the basic principles of profession-powered, subject integration, data-based research, and international vision. NAIS’s supporting foundation is their long-term accumulation of S&T consulting, cross-discipline integrated teams, a complete investigation system, a data resource platform, and civil S&T diplomatic channels to build a hub, platform, and open think tank.

2) Practice of STTTs

STTTs have a relatively objective and neutral research position. With its basic functional positioning of providing intellectual support for public decision-making, STTTs comprehensively promote S&T think tanks' participation in the government decision-making process, providing ideological support and action plans for major strategic decisions in the fields of S&T talent and S&T innovation. In order to enhance public welfare, the Institute develops research that closely integrates economic development, domestic needs, people's health, etc. At the same time, it provides research and publicity of the scientist spirit, carries out regular assessments

of the academic environment, and promotes a community atmosphere that honors science and innovation.

3) STTTs shall play a greater role in promoting science rapid development and social trust

STTTs summarize the "Five-ization" Model to promote science rapid development and social trust. First, the think tank "Themization". STTTs believe that a modern S&T think tank should have a distinctive, long-term focus on policy-making and consulting research areas and a high degree of sensitivity in the selection of topics. Second, the think tank "Systematization". STTTs believe that a modern S&T think tank should further promote a shift from the data source and tool layer to the application and value layer of professional research. Third, the think tank "Networkization". STTTs believe that a modern S&T think tank should continue to build a wide network of S&T workers to pool their wisdom and form a flexible think tank network. Fourth, the think tank "Internationalization". STTTs believe that a modern S&T think tank should comprehensively expand its international cooperation channels through different ways such as academic exchanges and joint research. Fifth, the think tank "Digitalization". STTTs believe that a modern S&T think tank's research methodology should also make a break through the previous patterns, and organically combine existing research methods with modern big data-driven analysis techniques.

2.2.3 Science and Technology Think Tank in Yangtze River Delta Region Innovative Practice and Reflections

1) Development status of science and technology think tank in the Yangtze River Delta region

The Yangtze River Delta region has a well-developed economy, strong research power and a large number of think tanks. According to incomplete statistics, as of the end of 2018. There are more than 200 think tank institutions in the Yangtze River Delta region, accounting for about 25% of the total number of think tanks in China.

In March 2021, the Alliance was established by the Tsinghua Yangtze River Delta Research Institute in Zhejiang Province, jointly initiated by representative high-end think tanks from three provinces and one city in the Yangtze River Delta. The Alliance is positioned to base on the practice of regional integration in the Yangtze

River Delta, summarize the theory of China's regional development, plan a new pattern of China's regional development, share China's regional development experience, complement each other's strengths, make the best use of each other's capabilities, form a synergy, and contribute Chinese wisdom and Chinese solutions to global regional development. Chairman of the Alliance: Yang Weimin, Deputy Director of the Economic Committee of the National Committee of the Chinese People's Political Consultative Conference and Director of the Institute of Regional Development of Tsinghua University.

2) Model cases of Yangtze Delta region institute of Tsinghua University, Zhejiang

Yangtze Delta Region Institute of Tsinghua University, Zhejiang is a new type of innovation carrier created by President Xi Jinping's personal planning, direct promotion, and strong support, a self-supporting, enterprise-managed institution jointly established by Zhejiang Provincial People's Government and Tsinghua University, the forerunner and leader in the implementation of the strategy of "introducing famous universities and colleges and building innovation carriers" in Zhejiang Province.

Based on the practice of the Yangtze River Delta region, the Think Tank Center will deeply summarize new theories of development, plan new patterns of development, share new experiences of development, and provide solutions to promote scientific and technological innovation and high-quality development.

It has built high-capacity platforms such as Zhejiang Province Key Laboratory of Applied Enzymology, Institute of Biotechnology and Medicine, and Xiangfu Laboratory, and introduced Professor Shi Songhai and Deng Haiteng's team from Tsinghua University to establish new engineering centers such as higher model animals and drug target identification to create a public R&D platform in the field of life and health.

3) Analysis of innovation carriers and new R&D institutions

The specificity of the state system and the universality of market orientation, innovation carriers, the core of which is the construction of an innovation ecology and the building of a bridge between research institutions and the market. At its core, is the emancipation of people. Leading economic activity and synergy of research activities is important to the innovation carriers and new R&D institutions.

4) Framework for international interaction between science and technology think tanks in the Yangtze River Delta

As for suggestions, to better construct the framework for international interaction between science and technology think tanks in the Yangtze River Delta. It is going to promote the exchange of theoretical and practical experiences in regional science and technology development, jointly plan exchange methods and brand activities, co-organize the China Science Innovation Forum, cooperate in publishing the internal magazine "Science and Technology Strategy", and build a new STI model of cooperation: the five-in-one model.

2.2.4 How to Better Promote International Collaboration in Science and Technology and Innovation, and to Reach Better International Think Tank Collaboration

For Information, the Center for China and Globalization (CCG) is a non-governmental think tank based in Beijing, founded by Dr. Henry Huiyao WANG and Dr. Mable Lu MIAO in 2008. CCG has been granted the official special consultative status by the Economic and Social Council of the United Nations (ECOSOC) as a non-governmental organization. In the 2020 Global Go To Think Tank Index by the University of Pennsylvania Think Tank and Civil Society Program (TTCSP), CCG ranked 64th of the top think tanks worldwide and among the top 50 "best independent think tanks."

CCG now has more than ten branches and overseas representatives and over 100 full-time researchers and staff engaged in research on globalization, global governance, international economy and trade, international relations, and global migration. CCG is also one of the rare domestic Postdoctoral Programme Research Centers, certified by China's Ministry of Human Resources and Social Security.

CCG has also built an international research network of leading experts in China and overseas. CCG engages in ongoing research on China and globalization from an international perspective and publishes more than 10 books every year in English and Chinese, as well as a series of research reports. It shares its research findings with the public and has published hundreds of thousands of related books and reports.

CCG has contributed to government policy-making on domestic and global issues. Its proposals and recommendations are regularly heard by relevant state authorities,

many of which have been acted on by China's central leadership and have served as references for major decisions made by relevant departments.

There are 5 suggestions from CCG's perspective, it is supposed to be about how could the think tank contribute to the policy formulation or something. Looking across the road, China's geopolitical implication is bigger and bigger for its impact on science and technology. In this context, it is imperative to strengthen international science and technology collaboration and people-to-people exchange. Therefore, CCG has to facilitate liberalization and facilitation of trade, but also for science and technology. No matter for offline and online forums, there is a gap here. CCG's first suggestion is that they need to make some efforts to make sure the collaboration exchanges across all the institutions, visiting scholars, students, and academics. They hope that they can have an international exchange of science and technology innovation ideas to attract talent. The second thing is that Asia-Pacific is very important. APEC summit meeting is going to be held. CCG hopes that the APEC best cases and practices can be shared among all the players in Asia-Pacific. That's a very important part of their work. APEC think tank dialogue is a very good case for bridging international collaboration. Thirdly, the different arrangement mechanisms in the Asia Pacific areas, it has been handed by a lot of representatives coming from the UK and also for the science technology collaboration. For digital economy issues, a lot of tech-related things should be integrated with other different mechanisms for international collaboration.

The fourth suggestion is whether think tanks could establish an Asia-Pacific think tank annual conference. That could be a great channel. Back in the past, CCG worked with Germany and France. Now, it is possible to work with Middle Eastern economies, South American economies, also with African economies in terms of science and technology cooperation, other than just within the EU. Recently, CCG heard that a contract was signed in China, in areas such as aerospace, pharmaceuticals, agriculture, and energy. China still has a lot of potential in clean energy, wind power, solar power, etc.

And lastly, CCG could cooperate with international think tanks, Asia-Pacific think tanks, or some new types of international institutions of science, technology, digital economy, carbon emission, etc. However, China does not have great infrastructure and also needs to look at soft power and innovation power. How could think tanks integrate the strength in the Asia Pacific to be aligned with more stakeholders and

actors for greater international cooperation? To improve think tanks' capacity building, it is necessary to start with a network of think tanks. If there is an annual preference, think tanks could issue any reports. Think tanks have to look at some of the key and emerging issues in the region, such as AI or chat GPT so that they could use the intentional exchange to boost these. At the same time, the think tank could try to use these financial exchanges to remove our misunderstandings and discrepancies. The Asia-Pacific is very important for us to have more cooperation in science and technology.

2.3 Republic of Korea

2.3.1 Proposing International S&T Cooperation Programs Based on Korean Institute of Science and Technology Evaluation and Planning (KISTEP) Role

Established based on Article 20 of the Framework Act on S&T in February 1999, Korean Institute of Science and Technology Evaluation and Planning (KISTEP) is the only STI Think Tank in Korea engaged in all the aspects of national S&T policy planning, R&D budget allocation, and evaluation, etc.

KISTEP has played a key role in the entire process of developing domestic policy from planning and budgeting to evaluation. The activities of the think tank focus on six areas: technology forecasting, policy planning, feasibility studies, budget allocation, program evaluation, and international cooperation.

First and foremost is the development of scientific and technical forecasts. Each year, KISTEP selects the top 10 potential technologies through a selection process that provides an in-depth breakdown of these technologies. KISTEP's selection of promising technologies for the future has had a huge impact both domestically and internationally. In order to grasp the trend of key domestic core technologies, a technology-level assessment is conducted every two years. In addition, each year KISTEP develops economic, social, cultural ethical, and environmental technology impact assessments at the environmental and other levels.

The second is the technology planning function. Every five years, Korea develops a Science and Technology Basic Plan, which is overseen by KISTEP. Last year the system the 5th Science and Technology Basic Plan for 23 to 27 years was established. In addition, KISTEP is developing the fourth phase of our Technology Talent Capital

Plan for 21 to 25 years, promoting and strengthening the Global Value Chain (GVC) ecosystem strategy and business planning dedicated to innovation challenges.

The third is to adjust the budget allocation for government R&D projects. In terms of budgetary reorientation, we are reorienting the R&D budgets of the ministries due to the inclusive growth of the STl strategy, overcoming the crisis through STl, economic recovery and development strategies, achieving the 2050 carbon neutrality target, etc. The domestic medium and long-term R&D investment directions for 2022 are centered on the domestic recovery, leapfrogging, and inclusion directions, with technology development to tackle the epidemic and achieve carbon neutrality by 2050 as a top priority.

Fourthly, the pre-feasibility survey. In Korea, under the National Finance, the government conducts preliminary feasibility studies when the total cost of a new project reaches KRW50 billion, of which the state investment exceeds KRW30 billion. As of 2021, a platform called R&D Feasibility Pathway has been created for 22 R&D projects to provide online advisory services for relevant information and materials.

The fifth is the research, analysis, and evaluation of government R&D projects. By focusing on the development of the three core projects and government-funded research institutions, and is currently conducting meta-evaluations of 208 government projects. In addition, KISTEP has established the Capacity for Science, Technology and Innovation Index, which will be used to measure the capacity of science, technology and innovation through the KISTEP.

Sixth, international scientific and technological cooperation activities. In 2020, the Ministry of Science, Information, Communication, and Technology established the Science and Technology Diplomacy Project as part of the Innovative and Inclusive National Science and Technology Diplomacy Strategy, designated KISTEP as the Science and Technology Diplomacy Centre, and promoted the KISTEP as an attempt to enhance its functions. KISTEP has also been promoting projects such as education and training to transfer experience in science, technology, and innovation policy to policymakers in developing economies. In addition, in order to better analyze issues related to domestic and international science and technology indicators are used to qualitatively and quantitatively compared to the other main indicators.

2.4 Malaysia

2.4.1 STI Development Opportunities for Youth, Women, and SMES In Malaysia

1) Introduction of University Malaysia

University Malaysia is a tertiary state university. Their vision is to create a global university impacting the world, their mission is to push the boundaries of knowledge and nurture aspiring leaders.

2) Why does Malaysia have the basic conditions for STI development?

In general, in terms of the public interest of Malaysians about STI, science and technology is quite wide rights, with almost 70 to 80% of the public general publics. STI issues can cover anything from new medical discoveries. They want to know about renewable energy environment pollution. The increased number of professionals from 2006 to maybe the last since June 7, June 16 or June 17. In recent years it has still maintained that level but not increasing. By 2012, the latest data is about 50%, so there is a balance of gender equality in those who are indeed professionals in Malaysia.

3) Some of the business situations in Malaysia

The majority of Malaysian businesses are small and medium enterprises (SMEs), 98.5% of them are actually SMEs. Although such a large proportion of businesses are SMEs, the contribution of SMEs to GDP is only 36.6%. By sector, the majority of SMEs are concentrated in the service sector, followed by the manufacturing sector, then the construction sector, agriculture and mining. When looking at the different types of ownership of these innovative enterprises, such as sole proprietorships, limited companies and public enterprises, it can be seen that limited companies are the main innovative enterprises. In this way, there are opportunities for Malaysia to develop business, for example, using private limited companies to promote innovation mechanisms.

4) Mismatched education and employment

Out of 14.8 million workers in Malaysia are Science and78.5% and vocational skills of firms found difficulty in having job-specific, technical. The skill gap issue occurs

when educational institutes (supply side) produce such employment that does not meet the requirements of the industry (demand side).

5) Promoting informal stem education

The National Science Challenge has been for a few years now. It is very popular. Malaysia rebuilt the motivation and also excitement among the kids and youth due to learning about science to know more about science. It is a very successful program and this test from the government, individual science enthusiasts, and passion for science. There are ideas that Ivy thinks they can cross borders with different economies to do this because they can talk about it here, they can do it within the economy as well, even make the collaboration.

6) What is Malaysia missing out?

For the time being, the Malaysian government and the industry still need to do more. In the GII Global Innovation Index Report, what is Malaysia missing out, there have seven components, and there are three components that Malaysia needs to address and improve on. The first is human capital and research, the second is the outcome, and the third is business sophistication limits.

2.4.2 How to Construct the Strategic Value of Think Tank in STI: Mutual Understanding and Foresights

1) Introduction of MIGHT

Malaysian Industry-Government Group for High Technology (MIGHT) is a public-private partnership that drives the high technology industry through strategic consultation, advisory and implementation. The institute conducts market intelligence, technology foresight & road-mapping and policy intervention across a wide range of industries and technologies. Their vision is to serve Malaysia in advancing competency in high technology through partnerships toward sustainable development.

MIGHT focus on four areas: the 4th industrial revolution, foresight, mobility, and sustainable development technology.

2) MIGHT's strategic roles

MIGHT has been instrumental in broad-based multi-ministerial policy formulation, facilitation and engagements. Spearheading the development of Malaysia's aerospace industry, championing for major investments for the comprehensive development of

the rail industry, and spurring sustainable economies through comprehensive Smart Cities Development.

Venture Tech is MIGHT's wholly-owned subsidiary which undertakes strategic investments in Bumiputera high-tech companies. MIGHT's approach is to identify technologies that are thematic in nature, with technology priorities that support: sustainability, security and mobility.

By providing a network of local and global linkages for members to capitalize on through synergistic partnerships, MIGHT is Malaysia's own unique organization that undertakes strategic alliances and performs analyses on the high technology industry and business opportunities.

3) The F.I.R.S.T.™ methodology

MIGHT is committed to creating a very comprehensive technology and business ecosystem that provides a compass-based guide to policy development from a policy development perspective. After having an STI policy, there is a need to further consider specific issues, for which MIGHT has summarized a methodology called F.I.R.S.T.™. "F" is for Funding & Finance, "I" is for Infrastructure & Institutions, "R" is for Regulations & Policies, "S" is for Skills & Talents and "T" is for Technology.

MIGHT champions the development of a complete techno-commercial ecosystem via the F.I.R.S.T.™ methodology in providing Strategic Advisory to Government and Industry, Nurturing and Investing in Technology Companies, as well as providing a platform for the development of Technology & Innovation Clusters

4) Introduction of Malaysia Foresight Institute

Malaysia is recognized as a prominent foresight centre, having resumed partnerships with many authorities around the world. The partnership has benefitted Malaysia through globally recognized thought leadership platforms, charting future directions emulated by others, and future-oriented capacity building. In order to form well-sustainable partnerships that can continue to shape & influence high technology & industrial development, the right foresight mechanisms need to be established.

First, clarity of desired futures. Establishing true north – in support of the domestic vision, mission, and aspirations. Second, connecting the dots. Understanding &

identifying issues as well as challenges either realized or anticipated. Third, prescriptions & framework for actions. Creating the required prescriptions & framework for the realization of the desired futures. Fourth, unintended consequences. Exploring & understanding unintended consequences of the prescriptions. Fifth, focus & prioritization. Providing focus as well as prioritization of resources & enabling actions. Sixth, participatory engagement. Allowing consultations & engagements with relevant stakeholders.

2.5 Peru

2.5.1 Creation of Technology-Based Companies

1) Type of technology-based companies

Scientific Spin-offs are a mechanism in universities and research centers to transfer applied scientific knowledge to society and are subject to a constantly developing legislative framework. Business start-ups are intensive in knowledge and created from the production environment to exploit new technologies, products processes or services in the market in a more agile innovative, and independent way.

2) Deep tech by any other name

Deep tech, emerging tech, science tech, future tech, hard tech, frontier tech, tough tech, extreme tech, physical tech, dirty tech.

3) Requirements of technology-based companies

Dominate a technology with potential for commercialization with sufficiently mature (in high TRL) and with a proven business opportunity in the market; Assume the leadership of the entrepreneurial project and form a competitive committed and multidisciplinary team as possible to combine technological development with business management; Develop a novel. The competitive and feasible business model derived from the product or service on which the business idea is based; Efficiently protect scientific knowledge as a source of competitive advantages and intangible assets; Develop a commercial strategy that is novel and solid to enter the market; Develop a networking strategy for the integration of the future company in the innovation ecosystem.

4) Effective financial instruments for growth

The innovation involves savings, family friends, entrepreneurship, and innovation funds. Francisco’s team managed to convince several large companies to collaborate with them in open innovation initiatives. This kind of collaboration allows startups to bring fresh ideas and challenge traditional thinking in their approach. The business has gained support not only in Latin America but also on an international scale. The representative had the opportunity to travel to Asia, including Hong Kong, China; Japan; and Korea where they observed how innovation ecosySTEMs operate. These observations influenced their decision to implement similar ideas in Peru. Francisco’s team has attracted significant investment from venture capitalists to facilitate its growth. Currently, they are focused on acquiring new knowledge to expand as a company and provide training for highly specialized scientists and engineers. Their ultimate goal is to develop solutions that will positively impact the economy and society.

5) Innovation ecosySTEMs

The innovation ecosySTEMs has been driven in the last years and that's why Francisco’s team has this international mentality that they don't have to be a company but they have to transfer the knowledge. Francisco’s team has a part of acceleration programs over there. The innovation ecosySTEMs in Peru helps Francisco’s team grow faster. Last year, Francisco’s team started to develop communication between all the stakeholders and they are very interested in being part of something larger and collaborating with other startups that for example, a similar job to Francisco’s team, but in order to grow faster and more powerful ideas will be part of science innovation policy.

2.6 The Russian Federation

2.6.1 The Contribution of STI Solutions in The Process of Global Challenges

1) Irina briefly speak about the contribution of STI solutions in the process of global challenges, which are definitely happening in emerging importance. Although International Centre for Innovation in Science, Technology and Education (ICISTE) hope today different areas that were mentioned in different STI areas, while ICISTE are analyzing the most actively developing directions in International ICISTE Corporation. Health and information technology are areas where they are trending in terms of technological innovation and they must maintain two pillars of work.

2) The first is the trend of development in the field of science and technology. The second pillar is the establishment of ICISTE's science and technology innovation mechanisms, both of which are very important. The development of science and technology innovation in the AI region must exist to serve the well-being of the people. Only after understanding one of the development trends in our science and technology development can ICISTE better consider the well-being of mankind.

3) The strong tendency for two urgent needs to be resolved in the world is full in terms of food security and food production and energy. These are the key areas that will prevail in the next 10 to 15 years. Participants can see that it's very serious, crucially important in the majority of strategies among each economy.

4) Agriculture and animal health areas contribute to food security and food production. The atomic energy, green energy and transport are contributing to the energy center. Irina mentioned that the global trend in interdisciplinarity. It has been already mentioned today. Interdisciplinarity is one of the key trends that is well represented in material science, which combines vast numbers of areas biology chemistry, maths construction, technology energy and so on.

5) Russia is ready to enhance and strengthen the STI dialogue within global ecosySTEMs. In 2021, Russia has successfully started implementing the next rows in the round of joint calls with individual affected economies among the key partner, China; Japan; Korea and some of the other economies. Their commitment is still to develop strong regional bilateral and multilateral programs, which work, and which were highly committed to do so.

2.7 Thailand

2.7.1 Bio-Circular–Green (BCG) Economy Policy

1) Bio-Circular–Green Economy (BCG) policy

The New Sustainable Growth Engine. Bioeconomy focuses on efficient utilization of natural resources along with natural balance protection, by using technological advancement in various disciplinary to increase efficiency and innovation. Circular Economy is the economic system in which all resources can be restored and re-utilized to avoid resource scarcity. Green Economy is an economic development model that is concerned with balanced development between the economy, society,

and environment. 3 Principles of Circular Economy are renewable, maintaining values of products, components, and materials, and minimizing systematic leakage.

2) Circular economy

Thailand's circular economy development framework is solving existing problems including waste symbiosis, reverse logistics&recycle circular food waste, and expanding economic opportunities including Circular Economy (CE) solution platforms, CE service providers, and CE entrepreneurs. About the circular design & solution platform, 100+ firms have joined, and 12 CE trainers developed and coached to design the CE business model and transformation blueprint using the CIRCO model and link with funding agencies & banks for grants and soft loans. The cross-sector CE value creation network includes construction companies network, agriculture waste, retailers, and textile companies. The RE100 Thailand Club aims to gather companies with the goal of using renewable energy or jointly buying and selling carbon in a voluntary form 23 founding members and 500+ companies/organizations have joined so far.

3) BCG demand for manpower

Thailand also forecasted their demand for manpower because they believe if they focus on the BCG policy economy model, they need both of their ideas. In addition, this is their anticipate demand in the near future for BCG and they try to achieve this also because they believe the manpower is the critical success factor for every policy. The adopting BCG model for the sustainable development of Thailand includes Thailand's 20-Year National Strategy (2017-2036), and Sustainable Development Goals (SDGs).

2021-2027 BCG ACTION PLAN’s vision concerns the growth of sufficiency and quality converse with STI, raising income, life quality, conserving, restoring, managing, utilizing, and increasing biodiversity, including building the sustainability of natural resources and biodiversity, strengthening the local economy, create the ability to respond for change and enhance sustainable competitiveness for BCG industrial level.

4) Thailand BCG Strategy and Action Plan

There are four main strategies. Firstly, to promote the sustainability of domestic resources and biodiversity. Secondly, to enhance the local economy. Thirdly, to

ensure the ability to respond to changes. Finally, to improve sustainable competition for the BCG industrial sector. Additionally, there are 13 mechanisms in place to drive BCG policy. Eeci—the BCG Annapolis, an ecosySTEM to translate research and innovation into sustainable regional economic development and societal well-being. Regarding driving BCG to regional and platform, the key priorities are facilitating trade and investment, rebooting regional connectivity, and advancing sustainable and inclusive growth.

5) Circular Economy (CE) technology foresight

The objectives are to explore the global demand and market opportunities for the use of essential Circular Economy technology, to assess technological capacity and establish the technology roadmap for the development of Circular Economy, and to examine the directions and strategies that APEC economies cooperate in terms of STI.

2.7.2 Foresight for STI Policy Formulation

1) Introduction of APEC Center for Technology Foresight (APEC CTF)

APEC Center for Technology Foresight (APEC CTF) is the first multi-economy level foresight organization in the world. It is a project of the Industrial Science and Technology Working Group (ISTWG) of APEC, established in 1998.

The ISTWG transformed into the APEC's Policy Partnership for Science, Technology, and Innovation (PPSTI) in 2012 when APEC agreed to broaden the group's mandate to include innovation policy development and to intensify cooperation among governments, businesses, and academia.

The Center was set up through the support of the Thai government and as a unit currently hosted by the Office of National Higher Education Science Research and Innovation Policy Council (NXPO). The mission of APEC CTF is "INSPIRING ACTIONS THROUGH PARTNERSHIP AND FAITH, TOWARDS APEC'S MUTUAL PROSPERITY." NXPO has succeeded the STI Policy Office as the policy agency of the Ministry of Higher Education, Science, Research and Innovation (superseding the former Ministry of Science and Technology).

The NXPO Office has established the "Sustainable Future Policy Division" as a unit to address foresight-related issues in a proactive manner. The rationale is that prudent policymaking is to be carried out with all the necessary information, with foresight

outputs being a key input. The division is explicitly specified as a functional unit in the NXPO’s structure.

2) Framework of policy life cycle and foresight tools

The APEC CTF plays a fundamental role in underpinning domestic policy development through a policy development framework—a framework of policy life cycle and foresight tools, with different agenda settings for different environments. The APEC CTF conducts policy research by meticulously detecting and scanning the social environment for trends and details. The analysis of strong and weak signals is used for policy design, providing policymakers with different options. Policymakers can select and implement the appropriate options according to the actual situation. As the policy is implemented, policymakers give back implementation and data to APEC CTF researchers, and they can use this information to develop new policies. It's like a feedback cycle.

Part III Policy Recommendation

BEIJING BLUEPRINT on Science, Technology, and Innovation Think Tanks Cooperation to Strength an Interconnected, Innovative, and Inclusive Future in APEC Regions

In order to reach the overall goal of APEC PUTRAJAYA VISION 2040, especially on its position as a modern, efficient, and effective incubator and accelerator of ideas, think tanks as institutions, corporations, or groups, are expected to help inspire. Science, technology, and innovation (STI) think tanks play a significant role in social-economic development, providing references for economies' science and technology policy decision-making in APEC regions. When think tanks are organized to study some subjects and provide information, ideas, and advice, those in technology fields can deliver guidance on innovation development.

This Blueprint is an achievement of the APEC funding project "PPSTI 05 2021". The project is operated to facilitate STI think tanks' cooperation to strengthen regional innovation development and connectivity, as well as provide macroscopic scale instruction to think tanks of specific technologies, with 30 participants containing public and private sector think tanks from 9 economies including Australia; Chile; People's Republic of China; Republic of Korea; Malaysia; Peru; Thailand; The Russian Federation; and the United States.

I. Purposes

1. Recognition: As the emerging global shifts happen in the world, science, technology, and innovation have turned to be key factors, with integration to other bases such as capital, lands, and labor on socio-economic growth. It is necessary to establish a relevant network for regional interconnection and to enhance the connectivity system on policy, market, program, platform, and resource.

2. Challenges: The world is currently faced with great uncertainty. Issues such as climate change, environmental pollution, public health security, and population aging, which accompany the development of economies, are common challenges that we must face. In the future, we will keep strengthening APEC Think Tank cooperation and focus more efforts on rational strategies and policies on STI, promoting international cooperation in science and technology to overcome the difficult challenges we face. We are conscious of the significance of the important strategies

and policies as the huge investment of millions to trillions, and the long-time of years to decades, as well as the tremendous impacts raised.

3. Opportunities: In order to achieve shared prosperity for all people and future generations, we need to focus on methods and strategies to seize opportunities. Nowadays, STI has been leading the evolution of social production methods and lifestyles. Our think tanks will enhance our communication & cooperation for building a resilient and interconnected space before the affected strategies & policies in STI, and advance broad-based subject to diversity with open exchanges and debates, so could contribute to the solution and compromise and mutual understanding focus on a series of problems, what include where common challenges, where joint benefit, where coordination requested, and where cooperation needed. We will strengthen our cooperation to gradually nurture a stable development environment driven by market and other factors and supported by the digital economy and innovation, to implement the common interests of regional socio-economic growth.

4. Measures: In the future, we will continue to follow up with long-term and consistent initiatives. We will insist on long-term, sustainable key initiatives for achieving regional economic development, which may include systemic methods including deepening the integration of industry and innovation chains, increasing the resilience of supply chains, and sorting out market needs, as well as specific methodologies including lean innovation, frugal innovation, and open innovation.

5. Advantages: We need to represent the advantages and expertise of think tanks in a practical way. Think tanks should provide strategic and long-term solutions to the current challenges for Asia-Pacific economic development, detect issues in a timely manner, and examine solutions with less investment. Meanwhile, think tanks should also gain a deeper understanding of the nature and effective ways of STI, through insights, thoughts, and dialogues to fully grasp the key points of the issues and to pre-empt risks in advance. Besides, as the deepen studies, broad information, and long-term practices, our think tanks can also contribute to the assessment, observation, and comments to all STI-relevant theories, modes, methods & formulates, to clarify the timeliness and feasibility with the insights in external and internal conditions.

II. Blueprints

1. Soft to Hard

1.1 Journal: We would like to work on journal publications through digital channels as the first step to deliver observations and outputs of STI think tanks in APEC regions, sharing understandings, analyses, insights, and best practices.

1.2 Steering Committee: We would like to work as a steering committee to provide information on STI think tanks in APEC regions, including excellent specific technology studies from think tanks and think tank rankings.

1.3 Mechanism: We would like to explore the possibility of setting up an institutional entity publishing journals, with the expertise from think tanks, academia, and the industry.

1.4 Talent Mobility: We would like to mobilize our talents to conduct research or project in our organizations.

2. Sharing to Network

2.1 Webinars: We would like to organize online dialogues on a regular basis to facilitate the exchange and connectivity of think tanks.

2.2 Salons: We would like to organize academic salons according to upcoming hot topics, trends, weak signals, and uncertainties on STI and to push the progress on research, knowledge, and technology commercialization.

2.3 Official Events: We would like to propose Think Tanks KOLs Talk to APEC PPSTI as official events under the APEC mechanism, and to explore applications of advanced technologies such as web 3.0 and artificial intelligence.

Appendix 1: Materials of APEC Workshops for the Report

List of Presenters

- Innovation, Cooperation and Mutual Benefit--A New Mission of Think Tanks in the Era of Globalization, Junkai LI
- The Evolution of STI Think Tank - Korean Perspective, Dr. ChiUng Song
- Bio-Circular–Green (BCG) Economy Policy, Dr.Surachai Sathitkunarat
- How strategic think tanks work for APEC priorities on regional high-quality development and cooperation, Dr. Hwanil Park
- Creation of Technogy-Based Companies, MSc. Francisco Cuéllar Córdova
- A promotion institution on international science and technology cooperation, Dr. Xiaoxuan Zhu
- Enhancing technology and research collaboration in the APEC region, Rolando Avendano
- The Contribution of Sti Solutions in The Process of Global Challenges, Ms. Irina Kuklina
- STI development opportunities for youth, women and MSMEs, Prof. Frances Separovic
- STI Development Opportunities for Youth, Women and MSMES In Malaysia, Prof. Ivy Chung
- SUSTAINABILITY IN FOOD EXPORTS Challenges for food export policies and strategies, Dr. Valeska V. Geldres-Weiss
- Using Technology Diplomacy to Support STI Think Tank Collaboration, Jin Xiaoming
- Public Participation and Social Responsibility of Science and Technology Think Tanks in the New Era: Practice & Thinking of National Academy of Innovation Strategy, CAST, Jinsheng Shen
- Science and Technology Think Tank in Yangtze River Delta Region Innovative Practice and Reflections, Jichun LI

- How to better promote international collaboration in science and technology and innovation, and to reach better international think tank collaboration, Huiyao Wang
- Proposing International S&T Cooperation programs based on KISTEP role, Haenga Seo
- How to Construct the Strategic Value of Think Tank in STI: Mutual Understanding and Foresights, Tan Shu Ying
- Foresight for STI Policy Formulation, Dr. Surachai Sathitkunarat
- The Role of Policy Research Think-Tanks in the Science, Technology and Innovation Eco-System, Rafiq Dossani