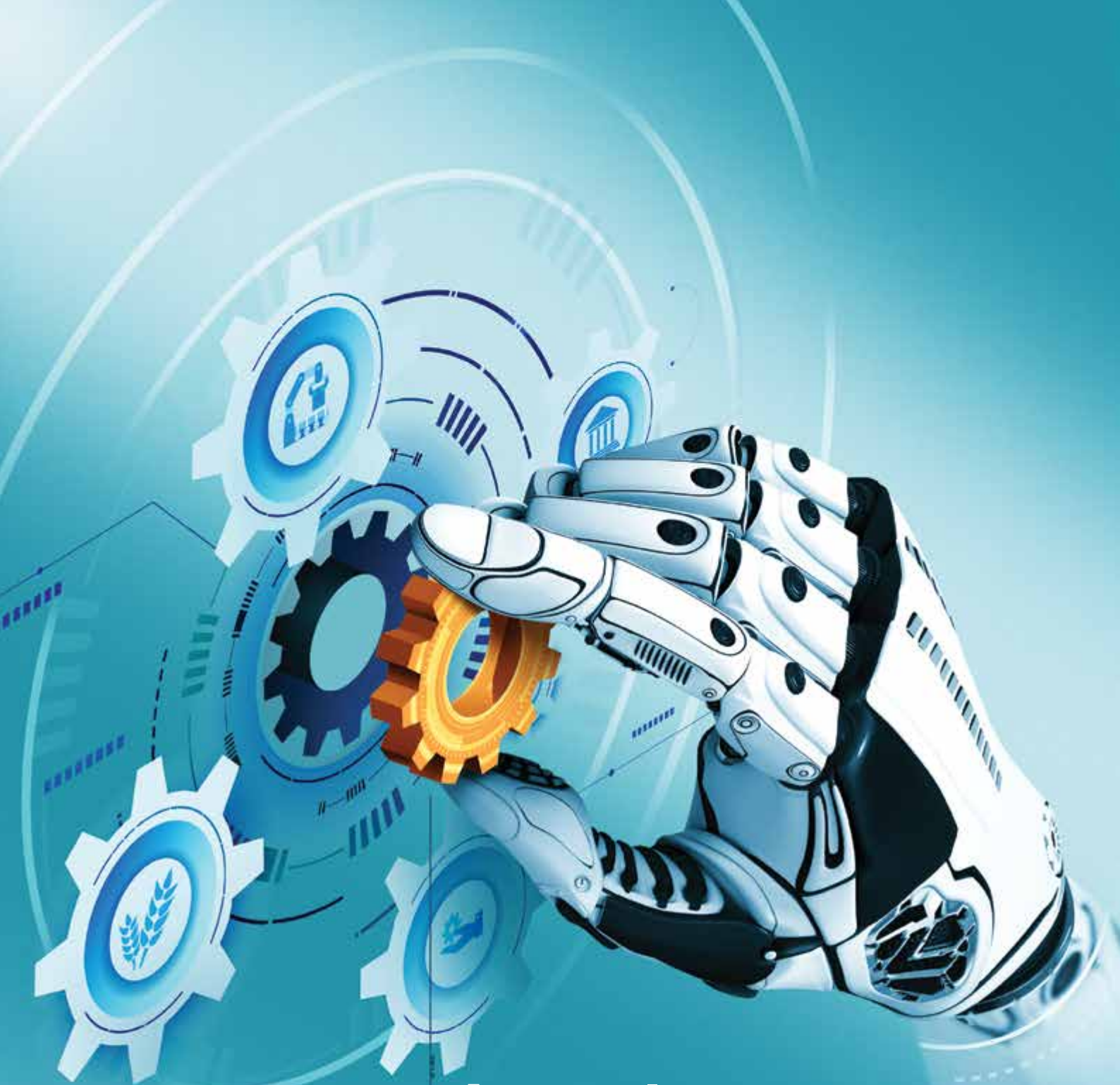

Annual Report 2019

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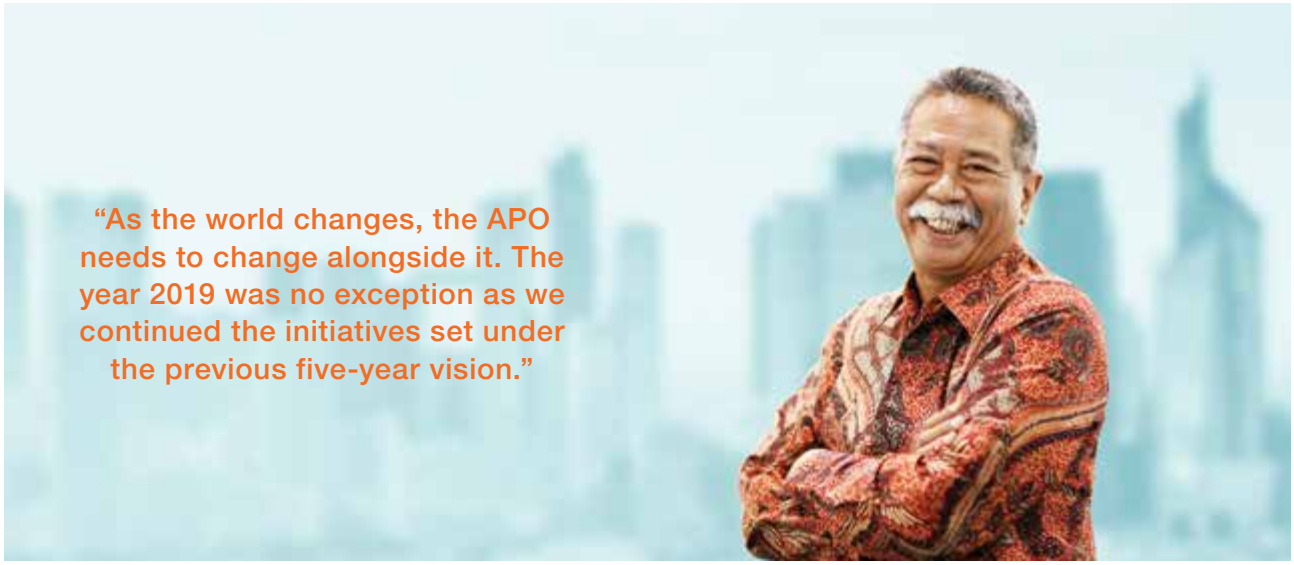
Foreword



I am pleased to return to the APO, where I had served in different departments of the Secretariat, after completing an extended appointment with another international organization. Rejoining toward the end of 2019, enthusiasm for injecting new, robust life into the organization was abruptly curbed by the unexpected arrival of the COVID-19 pandemic.

The pandemic has been deeply disruptive to the well-being of people in the Asia-Pacific and presents profound challenges to the international productivity movement. Everyone has had to adjust to a new normal as countries have gone into and out of states of emergency and lockdown. However, the work of the APO continues, and I believe that the mission of the organization is more important now than ever before.

As the world changes, the APO needs to change alongside it. The year 2019 was no exception as we continued the initiatives set under the previous five-year vision. With the steady spread of digitalization and automation throughout almost all sectors, the APO has implemented smart transformation programs to help our members manage these changes.

New disruptions have also underscored the need for the APO to adapt to emerging digital technologies. This included developing more online learning and digital-based programs. To facilitate that, the Secretariat strengthened its IT infrastructure and capability.

I am proud that the APO was able to successfully implement most of its planned projects for 2019. This was despite a forced, temporary relocation of the Secretariat following a fire incident in the building where the office is located, which lasted throughout most of the year.

Our challenges continue; our skill and resolve will be tested even more as the world navigates through COVID-19. Working with its cherished partners, I look forward to contributing to a sustainable, inclusive, innovation-led Asia-Pacific as we move onward.

Dr. AKP Mochtan
Secretary-General

Activity Report

Smart Transformation

INDUSTRY TRANSFORMATION

The Industry Transformation Program promotes improvements in production processes, management methodologies, business models, technologies, and strategies and policies to enhance productivity. It supports industrial upgrading and advocates for more sustainable ways of boosting economic performance to ensure that productivity gains are derived from activities with positive impacts in the long run and that the benefits can be shared among all stakeholders, including workers, employers, and communities.

Formulating Strategies for Digital Upgrading

To help member countries assess their readiness for digitization at firm, sector, and national levels, the APO organized a workshop on Developing a Roadmap for Industry 4.0. It showed how to formulate step-by-step strategies for digital upgrading. The policy benchmarking results presented in the workshop provided new perspectives on industrial development policies in member economies. The holistic approach to innovation and digital ecosystems introduced also suggested complementary

Workshop on Developing a Roadmap for Industry 4.0, ROC

strategies to reinforce current policies on initiating and sustaining digital industrial upgrading. Policy recommendations were developed by participants according to the contexts and readiness of their countries, providing practical advice for embarking on digital transformation.

Understanding Progress in International Standardization for Smart Manufacturing

As part of the efforts to connect member countries in the upgrading to smart manufacturing, the APO organized a workshop and Practitioners' Group Meeting on Standardization of Industrial Automation and International Symposium on Productivity Enablers in the Era of Industry 4.0 to review the current standardization landscape and initiatives by countries leading in technology. Policymakers, experts from standards authorities, and industry representatives discussed strategies for adopting, harmonizing, and developing industrial standards to ensure compatibility among machines, interoperability in applications, and communication among systems.

Model Organizations for Digital Upgrading

In addition to assisting member countries in developing strategies and capabilities for the digital transformation of industries, the APO provides direct support by establishing demonstration companies to showcase practical steps for digitization and disseminate experiences for similar organizations to learn from.

Following the successful digitization of the production line of an automotive equipment manufacturer in India, the APO extended its scope to the healthcare sector and provided technical support to a major hospital in Thailand. A pilot study digitized the hospital's health information system. With consultation and technical assistance provided by the APO-assigned expert, a digital information system was developed to connect and streamline the information and service flows of the hospital's chemotherapy unit. The system helped to reduce errors in diagnosis transcription, prescriptions, pharmacy dispensing, and patients' administrative records. It also introduced patient-centered hospital services, with shorter waiting times and lower administrative costs. Hospital staff were involved in the systematic planning and implementation of the demonstration project and are committed to upgrading systems for more responsive, productive healthcare services.

The Industry Transformation Program promotes improvements in production processes, management methodologies, business models, technologies, and strategies and policies to enhance productivity.

Workshop on Developing a Roadmap for Industry 4.0, ROC

PUBLIC SECTOR

Under the Roadmap to Achieve the APO Vision 2020, the APO is helping member governments to harness innovative digital technologies and models of governance to stay relevant in rapidly evolving conditions, meet citizens' expectations, and build the capacity to operate effectively as they face new demands, new expectations, and a fast-growing array of new know-how, technologies, and tools to enhance productivity. To be efficient and effective in today's complex, interlinked, fast-changing environment, governments need to redesign their structures and processes to capitalize on a new set of actors and tools. They need to adapt and continuously evolve to create value and stay relevant in rapidly changing conditions while meeting citizens' demands and operating effectively. The expectation now is that public-sector organizations should deliver faster services by harnessing digital technologies to fundamentally reimagine and transform the business models of government.

Exploring New Frontiers to Enhance Productivity

In supporting APO member governments in exploring new areas and opportunities given the progress in adopting digital technology in recent years, the Research on Digitization of Public Service Delivery was conducted to develop an overall framework under which public-sector organizations can increase the

Training of Trainers on Productivity Measurement for Public-sector Organizations, Philippines

efficiency of service delivery through reliance on digital technologies and to identify strategies to foster their digital transformation. Another important area that the APO explored through research was Education for Future Industry to examine how educational institutions in general should be positioned to prepare graduates for changing society and future workplaces. The results of both studies will help APO member governments in framing policies and program directions, especially in the areas of public service delivery and human resources development for the future.

Institutional Strengthening and Capacity-building Initiatives for the Public Sector

A course on the Development of Public-sector Productivity Specialists (APO Certified Public-sector Productivity Specialists) was conducted to develop the skill sets required for participants to become APO-certified public-sector specialists. Participants learned about the concepts, approaches, tools, and techniques that will develop their competencies as productivity specialists for the public sector.

To be efficient and effective in today's complex, interlinked, fast-changing environment, governments need to redesign their structures and processes to capitalize on a new set of actors and tools.

Workshop on Measuring, Monitoring, and Evaluating Regulatory Performance for Productivity and Competitiveness, Malaysia

In reviewing regulatory management approaches and practices of governments and determining the gaps in regulatory administration and enforcement, a workshop on Developing a Regulatory Management System (RMS) Framework to Improve Public-sector Productivity was organized. To make an RMS successful, a workshop on Measuring, Monitoring, and Evaluating Regulatory Performance for Productivity and Competitiveness was also conducted to equip participants with the knowledge to assess the effectiveness and quality of regulatory policies/programs for better design and implementation.

In order to acquaint public-sector organizations with the concepts of and approaches to measuring their productivity, a training-of-trainers course on Productivity Measurement for Public-sector Organizations was implemented through the Center of Excellence on Public-sector Productivity within the DAP. The course objective was creating a pool of trainers on productivity measurement for the public sector, including key indicators for different services, in member countries.

A workshop on Accountable Governance for Productivity Growth and Competitiveness was held to review the importance and implications of accountable governance for the productivity growth and competitiveness of member countries. The World Economic Forum Competitiveness Indicators were used as a reference for evaluating the productivity and competitiveness achievements of good governance at the national level.

The APO also published *Measuring Public-sector Productivity: A Practical Guide*, which explains the concepts and measurement of productivity and why citizens should be concerned about the productivity performance of the public sector. A good performance system and management are crucial factors for an accountable, productive public sector. In order to strengthen current performance management systems, a workshop on Advanced Performance Management for Modern Public-sector Organizations was held with the aim of reviewing and assessing existing government efforts in this area in member countries.

To increase the utilization of digital platforms available for enhancing public-sector productivity, the self-learning e-course on Basic Data Analytics for the Public Sector was launched. Its objectives are providing a basic understanding of data analytics in the public sector, introducing key quantitative analysis methods and skills in understanding data analytics, and improving problem-solving capacity in the sector through data analytics to result in better public services.

SMART SERVICES

Service-sector productivity is the key to future economic growth. However, actual trends in APO member countries show that productivity in the sector has stagnated over a long period. It is therefore important to analyze why service-sector productivity is important for future growth, why it is not improving in member countries, and how investments in ICT and other key technologies could contribute to innovation and growth in a broad range of services.

Healthcare Sector

The use of smart technology in the service sector has been increasing rapidly, and recent advances, especially in software, have made it a hotbed of innovation and technological progress. The APO organized a training course on Smart Service and Technology for the Health Sector to discuss the effects of smart technology on healthcare productivity and analyze the current productivity policies of APO members for the sector. Participants learned about cutting-edge smart services and technologies and shared information on their future trends for healthcare productivity improvement.

Smart Cities

A smart city approach promotes innovation and competitiveness in urban areas as well as citizen engagement. It ensures that cities, as core engines of growth, meet the needs of present and future generations in economic, social, and environmental terms, while contributing to shared prosperity. The APO organized a workshop on Developing Standards for Smart Cities focused on the overall concept and main features of smart city solutions. Best practices of successful smart cities, especially from the viewpoint of policy and administrative components and community engagement in development, were presented. Participants also drafted standards for smart cities relevant to APO member countries.

Smart Technology to Raise Productivity in the Service Sector

Smart technology can boost productivity in the service sector. The Internet, interactive platforms/websites, ICT, smartphones, etc. have direct/indirect impacts on productivity in the service sector. The APO organized a workshop on the Use of Smart Technology to Raise Productivity in the Service Sector to discuss the effects of smart technology on service-sector productivity, analyze current service-sector productivity policies of APO members and serve as a major platform providing opportunities to learn more about the latest trends and cutting-edge smart technologies that are crucial in driving future productivity for the service sector.

Workshop on Developing Standards for Smart Cities, ROK

AGRICULTURE TRANSFORMATION

Agriculture Transformation

Agriculture transformation lies at the core of poverty reduction, food security, and improved nutrition. Transforming a country's agriculture sector can create jobs, raise incomes, reduce malnutrition, and kickstart the economy. Governments are also focusing agriculture transformation plans on the UN Sustainable Development Goals (SDGs) by considering climate-smart strategies, women's economic empowerment, and biodiversity. The adoption of new technologies will be critical to achieve those goals. By using technology as a sustainable, scalable resource, agriculture can be transformed into a future-proof industry including productive, sustainable food value chains (FVCs).

In 2019, the APO implemented three projects under the Development of NPOs Program using special cash grants from the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan. One was an international conference in the ROC for local stakeholders to discuss smart agriculture topics such as Internet of Things applications and digital services in agriculture, information service platforms, agricultural data analysis and decision support systems, and smart machinery and robotics.

Sustainability was another focus in projects in 2019. Through a project in Bangladesh, participants were able to observe 62 potential technologies in the Climate Technology Park related to climate change adaptation and mitigation, which could potentially be replicated or adapted at the rural and urban community levels in their countries. Other APO projects examined how agribusinesses could stay competitive through new business models and organizational structures.

The APO also published the APO Agriculture Transformation Framework (ATF) as a guide to understanding the digital readiness of member countries. The ATF gives member countries a tool for increasing productivity through applications of modern technologies.

Food Value Chains

An FVC is a series of activities that create and build value at every stage from agricultural production, manufacturing, processing, and distribution to consumption. The environment surrounding FVCs is changing with increasing consumer demand for better-quality, safer fresh food, more convenient food, and small-sized package delivery, which must be considered when developing sustainable FVCs. FVC technology is advancing rapidly, offering more opportunities for transformation.

By using technology as a sustainable, scalable resource, agriculture can be transformed into a future-proof industry including productive, sustainable food value chains (FVCs).

Workshop on Trends in the Development of Traditional Craft Villages in the Industry 4.0 Era, Vietnam

Workshop on Smart Farming Models, Thailand

In 2019, a national follow-up project in Cambodia was conducted to formulate a general roadmap with extension programs for moving the agribusiness sector and FVCs into the future. In Mongolia, services for the institutional strengthening of the MPO were provided, a course for consultants and trainers on FVCs was held, and an observational study mission on sustainable FVCs was conducted under a cash grant from the MAFF of Japan.

Under the Development of NPOs Program using special cash grants from the MAFF of Japan, a national workshop in Mongolia contributed to enhancing the productivity and competitiveness of its agrifood sector through sustainable FVCs. A national conference in India with 150 participants introduced key stakeholders to the latest technologies and best practices in FVCs to raise productivity as well as the safety and quality of agrifood products, especially among SMEs.

In cooperation with Cornell University, a resource paper with holistic analyses of innovative institutions shaping agroindustry development in the Asia-Pacific was finalized.

Rural Community Development

Both developed and developing countries are experiencing aging, shrinking rural populations. Rural dwellers seeking better job opportunities and improved lifestyles are moving to urban areas. Overall depopulation, especially the outflux of working-age people from rural communities, has caused stagnant economic growth and farm productivity. Nurturing skilled labor, attracting entrepreneurs to rural areas, and creating a business-conducive environment in agriculture are strategically addressed through APO projects.

In 2019, the APO conducted workshops on Innovations in Agribusiness for Young Entrepreneurs, Trends in the Development of Traditional Craft Villages, and Rural Community Development for Sustainable and Inclusive Growth, which addressed issues involving the youth and women. Rural revitalization through agripreneurs was also emphasized. The value of collective community-based knowledge in inclusive development efforts was illustrated through methods such as asset mapping to maximize benefits from existing rural resources.

FUTURE FOOD

The world population will reach around 10 billion in 2050. Demand for food and animal feed is set to at least double. Increasing pressure on already stretched resources like land and water can endanger their sustainable use. The mission of the APO Future Food Program is to contribute to sustainable food security in member countries in cooperation with global professionals and key stakeholders in the food industry by promoting nutritional alternatives along with innovative technologies and systems and strengthening networks of agencies and companies working for future food development.

The APO Secretariat expanded its expert network on future food to enable more activities in this area. A workshop on Food Safety Regulation and Related Issues was organized, and participants reached a consensus on key factors such as promoting awareness of the importance of science-based, harmonized regulations and the need for regular updates on food safety issues through similar workshops.

The mission of the APO Future Food Program is to contribute to sustainable food security in member countries in cooperation with global professionals and key stakeholders in the food industry by promoting nutritional alternatives along with innovative technologies and systems and strengthening networks of agencies and companies working for future food development.

Workshop on Food Safety Regulations and Related Issues, Lao PDR

Capability Development

Conference on the Future of Work, ROC

STRATEGIC FORESIGHT

The Strategic Foresight Program aims to improve the long-term developmental planning capabilities of APO members by:

1. Instilling strategic foresight mindsets and practices within the APO Secretariat and in member governments; and
2. Providing relevant knowledge of trends and drivers affecting productivity and development

Research, workshops, training courses, conferences/forums, and self-learning e-courses continued to be conducted in 2019 to achieve these objectives.

The APO released two *Quarterly Emerging Trends Reports* in 2019. They explored a wide array of social, technological, economic, environmental, and political trends in APO member countries and beyond. The report *Research on the Future of Work in the Asia-Pacific* was completed and due to be released in 2020. This was a collaboration between the APO and Reos Partners, an international social enterprise. This publication is an introduction to exploring the future of work and was designed to stimulate new questions, thinking, and approaches to making sound strategic decisions when tomorrow is uncertain.

Another research project was initiated on the topic of Education for Future Industry, which looked at the ways higher education systems can be reformed to better serve the upcoming needs of economic sectors. The report from that project is also scheduled to be published in 2020. Both studies specifically focus on expanding the understanding of APO stakeholders of major areas likely to affect productivity in the short to medium terms.

Conference on the Future of Work, ROC

Efforts to provide APO members with information on trends and drivers also included a range of conferences and workshops on priority topics such as the Internet of Things (IoT), the future of work, and disruptive technologies for productivity enhancement.

There were also a few projects aimed at instilling strategic foresight mindsets and practices within the APO Secretariat and in member governments. The APO has a three-phase roadmap for building foresight capacity in the region. The first phase consists of multicountry training, under which training courses were held in Malaysia and Fiji on Foresight Management, targeting public-sector officials and consultants. A second-phase training of trainers on Scenario Planning and Strategic Foresight was organized in Manila.

To complement face-to-face projects to spread foresight practices and thinking in APO members, the Secretariat also launched a self-learning e-course on Critical Strategic Foresight Tools for Sustainable Productivity. It introduces a critical mass of individuals to the fundamentals of strategic foresight and scenario planning, while also serving as a supplement to onsite training for participants expecting to or who already have completed APO foresight training.

SUSTAINABLE PRODUCTIVITY

One of the strategic directions under the Roadmap to Achieve the APO Vision 2020 is to catalyze innovation-led productivity growth. This is directly linked with the goal of increasing productivity and the mission of contributing to sustainable socioeconomic development through enhancing productivity. The new Sustainable Productivity Program is designed to reinforce the connections among the APO's strategic directions, goal, and mission.

The unprecedented rate of technological progress, mostly attributed to the digital revolution, has brought new challenges. One challenge is the need to redefine the concepts of economic production and its efficiency. Existing economic and productivity measurement tools, however, do not adequately reflect the gains coming from digital services. In addition, it is important to view productivity improvement as a forward-looking concept in which what counts is not only how productive we are at a certain point in time but also the prospects for continuous productivity gains in the future. The disruptive nature of technological progress makes it necessary to integrate the external context and dynamics into internal innovative processes so that economies can develop future-proof innovations meeting long-term needs and expectations.

Resolving the Productivity Paradox

Measurement problems are at the heart of the productivity paradox. The APO and OECD launched the first phase of collaborative research on *Developing Improved Statistics and Methods for Sustainable Productivity*. The emphasis in this phase is refining the current measurement methodology to broaden its coverage and improve its measurement techniques, particularly to capture free digital products and services. The subsequent phase will attempt to fit the new measurement techniques to real data before further refinement.

Another effort was underway in 2019 to investigate factors affecting national productivity in the long term through a research project on *The Development of Long-term Productivity Measurement* representing a cooperative effort by experts from Australia, the ROK, and USA. The objective is to devise a ranking system based on the probability of sustaining productivity growth. A composite index comprised of several indicators will be proposed to indicate target countries' long-term performance based on current circumstances.

Establishing a Research Collaboration Platform for Anticipating Emerging Issues Related to Productivity

The APO believes that cooperation and collaboration are optimal ways to tackle common issues such as the productivity slowdown. A platform for research collaboration was therefore established with the Statistics Department of the OECD. Research on an index for long-term productivity growth is also being performed in cooperation with the University of Queensland of Australia, Yonsei University of the ROK, and University of Miami of the USA. These platforms and collaborative initiatives will be expanded to address common global productivity issues.

Workshop on Sustainable Productivity, Japan

CENTERS OF EXCELLENCE

To date, five COE have been established: the COE on Business Excellence (BE) (2009, Singapore); COE on Green Productivity (GP) (2013, ROC); COE on Public-sector Productivity (PSP) (2015, the Philippines); COE on IT for Industry 4.0 (2017, India); and COE on Smart Manufacturing (SM) (2019, ROC). In 2019, various activities were conducted to strengthen COE capabilities and related efforts in member countries.

COE on BE

Strengthening the Capabilities of BE Assessors

To enhance the capabilities of the pool of assessors under the COE on BE, a resource person from the USA was assigned to facilitate a three-day seminar from 13 to 15 November in Singapore. The seminar sharpened the skills of BE assessors and oriented them in a new BE management perspective through presentations and case studies on effective BE assessment, leadership, and the Baldrige Excellence Framework model. Forty BE assessors of Enterprise Singapore were also guided throughout the discussion sessions to strengthen their competencies and elevate their level of understanding of best practices. The knowledge is expected to be emulated by other BE assessors, consultants, and practitioners in APO member countries.

Review of Member Countries' BE Needs

APO member countries have been supported by the COE on BE in building up capacity and expertise on BE, enhancing their capabilities in managing BE initiatives, developing and strengthening quality award systems, improving the productivity of various organizations, etc. In 2019, the APO assigned one expert to review the needs of member countries to extend better assistance in enhancing BE capabilities starting in 2020.

COE on GP

Enhancing Knowledge on Green Technology and Green Consumption

Since its establishment in 2013, the APO COE on GP has promoted the adoption of GP as an approach to achieve economic prosperity along with sustainable development. In 2019, efforts to strengthen the institutional capabilities of the COE were made. To enhance knowledge and exchange best practices under the COE on GP, the APO assigned two experts to an Industrial Collaboration Summit in Green Technology held in Taipei, 16–19 October. The experts shared knowledge on green technologies in the Asia-Pacific to foster green growth and achieve sustainable development.

Subsequently, to promote sustainable food systems, a focus of the COE on GP, a three-day International Conference on Green Consumption focusing on food miles and carbon footprint reduction was held in Taipei from 26 to 28 November. Three experts from Japan, North America, and the Netherlands shared reports on innovative technologies and best practices in handling food waste as well as promoting sustainable food systems. The expertise of the COE on GP on these topics was therefore enhanced.

The seminar sharpened the skills of BE assessors and oriented them in a new BE management perspective through presentations and case studies on effective BE assessment, leadership, and the Baldrige Excellence Framework model.

COE on Smart Manufacturing, ROC

COE on Business Excellence, Singapore

COE on Green Productivity, ROC

COE on Public-sector Productivity, Philippines

COE on IT for Industry 4.0, India

Dissemination of Technical Expertise on e-Waste Management

On the other hand, the COE on GP utilized its pool of experts in the four priority areas of resource recycling, green energy, green factories, and ecoinnovation to strengthen the capabilities of member countries. APO members benefited through those services to enrich their knowledge, understanding, and application of GP tools, techniques, and methods. Two experts from the COE on GP were sent to the International E-waste Management Network Workshop, organized 28 November–4 December in Bangkok. Experts also visited various local government agencies and companies in Bangkok to conduct technical assessment of the market demand for waste management services. Policy exchanges and discussions on the 3Rs and waste management topics with different agencies were held.

Review of Emerging and Priority GP Needs

Defining needs through multiple channels including research has contributed to the success of the COE on GP since its establishment. Learning about and sharing technical expertise and best practices of the ROC based on the needs identified were

facilitated. This approach resulted in the wider adoption and application of relevant GP tools, techniques, and methods in other APO member countries. Given the recent trends and developments in GP-related themes, it is necessary to reidentify and reprioritize the areas, sectors, and institutions that require support from the COE on GP. In 2019, two experts were assigned to conduct the review and recommend initiatives that should be pursued in 2020 to advance the implementation and adoption of GP practices in member countries. Activities that specifically strengthen the capacity for GP promotion will be prioritized.

COE on IT for Industry 4.0

Establishment of an Expert Database on IT for Industry 4.0

To reinforce its position as a knowledge center on IT and its applications for Industry 4.0, a directory of national experts in the field was developed in 2018 by the COE. The database was expanded internationally in 2019. An expert was assigned to design the database structure divided into various IT domains for Industry 4.0 and then oversee the input of contents. Completed in November 2019, this systematic database offers member countries access to directories of individual experts and institutions on Industry 4.0 across sectors.

Industry 4.0 Digitization Strategies for SMEs

The COE on IT for Industry 4.0 initiated research on Industry 4.0 Digitization Strategies for SMEs. The results support SMEs in member countries in moving toward digitization and staying competitive in global value chains as the Fourth Industrial Revolution proceeds. A chief expert from Germany and five national experts from the ROC, India, Indonesia, Malaysia, and Vietnam were selected to undertake the research. In December 2019, the report emphasizing that greater awareness of the benefits of Industry 4.0 digitization among all stakeholders and improved access to the Internet, advanced technologies, and funding for digitization initiatives among SMEs were the critical needs of SMEs was published.

Digital Innovation Process Guide for Manufacturing SMEs

To support SMEs in the process of digital transformation for Industry 4.0, the COE on IT for Industry 4.0 and the APO commenced a research project to publish an approach paper guiding SMEs in manufacturing in undertaking digital innovation. The research was initiated based on the finding that the majority of SMEs in the manufacturing sector had yet to put digital technologies and digitization to work, and SMEs must embrace digital innovation to enhance efficiency and meet international quality standards. Digital innovation processes suggested for use by SMEs to achieve sustainable growth and productivity gains will be analyzed and recommended.

Case Studies of Manufacturing Transformation Strategies for Industry 4.0

Protecting domestic markets from international rivals while simultaneously tapping new markets for long-term growth is a key concern. A variety of approaches is taken by manufacturing firms to transform their businesses and find ways to differentiate themselves to stay competitive in global value chains. A research project on Case Studies of Manufacturing Transformation Strategies for Industry 4.0 to support manufacturers by identifying successful examples of business strategies leading to transformation was initiated. The best practices allowing firms to remain relevant and sustain growth will be analyzed. Preparation for the research activity started in 2019.

Development of Demonstration Companies on IT for Industry 4.0

The APO COE on IT for Industry 4.0 led the development of demonstration companies on IT for Industry 4.0 in SMEs. This is also part of the COE's efforts to develop and share expertise with other APO member countries. The SME demonstration companies involved are supported in applying and utilizing IT solutions for the successful application of Industry 4.0 technologies in organizational processes while improving their productivity performance. The capacity for utilizing data, digitization, and the Industrial IoT to raise manufacturing quality while simultaneously reducing costs will be enhanced. The processes and results of this project will be disseminated to other organizations by the COE to achieve multiplier effects among SMEs. Five demonstration companies were selected and supported by the APO and NPC in 2019.

Research Mission on IT for Industry 4.0

To scale up the expertise of the COE at the benchmarking level against top-notch institutes in the area of IT for Industry 4.0, a research mission under the COE umbrella was organized 9–14 December in Seoul. Six participants from the COE on IT for Industry 4.0 visited various advanced manufacturing firms in the Korean Silicon Valley to observe successful IT-enabled services in connected industries. The national plan for Industry 4.0 was shared through visits to policy institutes on industry and innovation. This mission also facilitated the expansion of networks and partnerships with experts, enterprises, and institutions in the ROK. This is part of efforts to strengthen the COE's position as a knowledge center on IT and its applications for Industry 4.0. Ultimately, the strengthened COE will in turn assist other APO member countries in building up their capacity and expertise, improving the productivity of various organizations.

Development of a Toolkit on Industry 4.0 for SMEs

A toolkit guiding SMEs to identify their own definitions of and approaches to Industry 4.0 and supporting them in adopting new, often disruptive business models was developed in 2019. It covers the fundamentals of Industry 4.0 and its implications for SMEs. More specifically, different tools and techniques, methods, a maturity index, and sets of technologies for the Industry 4.0 transformation of SMEs are introduced in a single useful package.

COE on Smart Manufacturing (SM)

The COE on SM was launched in conjunction with the International Forum on Smart Manufacturing in Taichung on 6 August. The Minister of Economic Affairs of the ROC, Deputy Mayor of Taichung, international forum attendees, and more than 100 local participants were present at the launch.

Deputation of Experts to APO Member Countries

In 2019, the APO Secretariat assigned experts from the COE on SM to undertake missions to enhance knowledge and exchange best practices on the topic. Three experts visited different government organizations in Vietnam (July) and Thailand (November) to discuss policy measures facilitating the adoption of smart manufacturing. Visits were also made to enterprises in those two countries to present methods for conducting smart manufacturing maturity measurements for productivity gains. Specifically, the Smart Manufacturing Experience demonstration site and CPC MES+ system to assess the readiness levels of enterprises were introduced.

Assessment of Smart Manufacturing and Needs of Member Countries

A research project to assess the extent of implementation and adoption of smart manufacturing in member countries and identify related needs was initiated in 2019. The output of this research will help the COE and APO in designing and implementing smart manufacturing activities that are relevant and attuned to the needs of members.

Assessment of Smart Manufacturing and Needs of Member Countries, ROC

One chief expert from the ROC and five national experts participated in the research. A coordination meeting was held 12–14 November in Taipei to determine the research framework and how the needs would be assessed in each participating member.

Monitoring and Evaluation of the Performance of the APO COE

In 2019, an evaluation of the performance of the APO COE was conducted. The primary purpose was to assess how COE have implemented their planned activities to strengthen their capabilities and benefited participants and/or organizations in member countries. The expert evaluation of COE performance will also make recommendations for the institutionalization of the performance evaluation process as well as refinement of the evaluation criteria and M&E framework to assess annual performance. Other achievements and next steps to achieve the intended results more effectively in the future are also expected from the COE performance evaluation report. One expert was assigned to start the evaluation in October 2019.

PROGRAM DEVELOPMENT FUND

Under the PDF in 2019, a major objective was holding meetings of the Steering Committee and the Technical Working Group (TWG) to formulate the APO Vision 2025 and its accompanying strategies for approval by the Governing Body, since the term of the APO Vision 2020 was to be completed. Vision 2025 and its accompanying strategies will enable the APO to have greater impact on improving the productivity of member countries with the appropriate goals, a robust M&E system, etc.

Another activity was examining methods to improve how surveys are conducted to monitor and evaluate APO projects. It was decided to adopt the well-known software program Qualtrics for use from 2020. This fund was also utilized for the accreditation and certification activities of the APO. Finally, research on knowledge management with the concept of sustainable productivity was also conducted under the PDF.

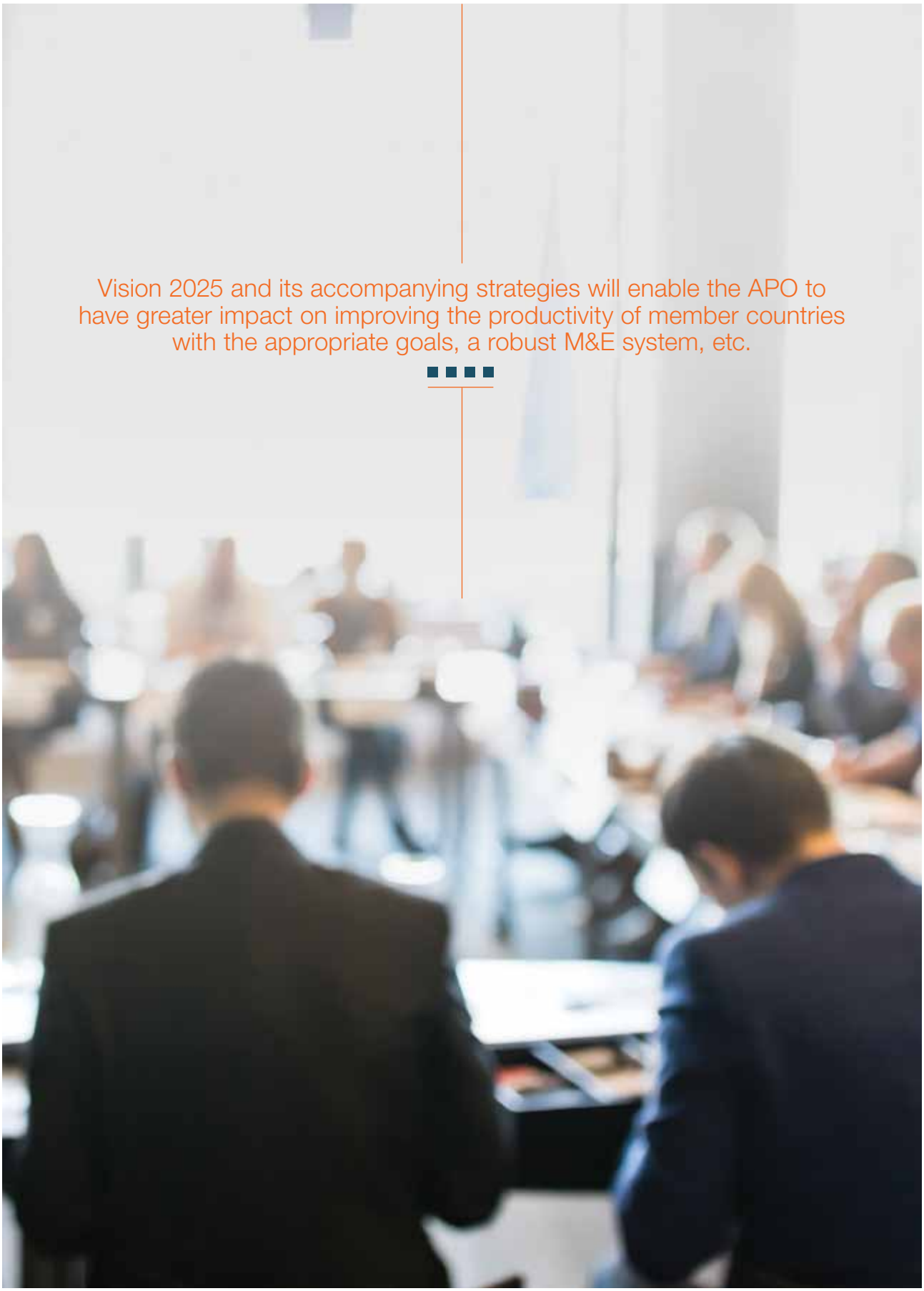
The APO hosted the 1st Meeting of the Steering Committee on Vision 2025 in November 2019 in Tokyo, with eight delegates from member countries. During the meeting, the interim report on Vision 2020 was shared and evaluated. A new vision statement was also proposed and agreed upon by the delegates.

As part of the accreditation and certification process, the Secretariat has successfully issued digital tamper-proof certificates on the Ethereum public blockchain. This technology allows secure authentication of all professional certificates issued by the Office of the Accreditation Body (OAB). It also stores and verifies APO data so that certification records, attendance records, and other transactions are in tamper-proof, open-source format. The pilot project supported current APO accreditation of certification bodies as well as certification of professional productivity practitioners and specialists in GP, public-sector productivity, and foresight. The results of the pilot project will be disseminated among NPOs to illustrate how data integrity can be maintained through blockchain technologies.

An APO research project on Knowledge Management with the Concept of Sustainable Productivity was initiated in 2019. It was designed to present practitioners with practical information for enhancing productivity, first at the macro and then at the micro level, by taking into account the factors of agility in the face of change, the need for constant innovation, and new forms of knowledge technologies.

Task Force for Developing Vision 2025, Japan

Vision 2025 and its accompanying strategies will enable the APO to have greater impact on improving the productivity of member countries with the appropriate goals, a robust M&E system, etc.



ACCREDITATION BODY

Accreditation was identified as one APO business transformation initiative to raise its visibility as a leading global productivity organization. It also aims to enhance the capability of NPOs by expanding their activities to include certification and subsequently increasing the number of certified productivity professionals in their countries. This initiative is also a starting point for member countries to receive recognition for developing the competence of productivity professionals. Therefore, the APO Accreditation Body (APO-AB) was set up as an impartial entity within the Secretariat to recognize organizations including NPOs as APO Certification Bodies (CBs). To ensure alignment with international requirements for accreditation bodies, the APO-AB has an organizational structure that includes a council and TWGs. The council serves as the highest authority that sets the vision, mission, and direction of the APO-AB. It is composed of a council head and representatives of NPOs, governments, national CBs, and industry.

In 2019, the Secretariat focused on developing internal rules and procedures in setting up the APO-AB, certification schemes, and general requirements for CBs. The main achievements are summarized below.

APO-AB

The APO-AB was formally established in the Secretariat, with an AB Council, TWGs, and OAB. The AB Council consists of the APO Secretary-General; NPO Heads; representatives from Fiji, Japan, Malaysia, Singapore, and Pakistan; and representatives of the Indonesia Professional Certification Authority, Ministry of Economy, Trade and Industry of Japan, Japan International Cooperation Agency, Japan SME Management Consultant Association, and Thailand Management System Certification Institute. TWG members are technical experts and headed mainly by AB Council members. The OAB is responsible for managing and coordinating APO-AB development projects, activities, and documentation systems and convening the annual AB Council Meeting. In alignment with the international standard on Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies (ISO/IEC 17011:2017), the OAB is not involved in APO training courses related to certification.

APO-AB Operational Standards and Procedures

To ensure that the operational and management systems of the APO-AB comply with the Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies (ISO/IEC 17011:2017), standard operating procedures were developed. A TWG was set up to assist the Secretariat in developing accreditation-related documents, headed by the President of the Foundation

APO Accreditation and Certification Development Program: APO-AB Council Meeting, Japan

APO Accreditation and Certification Development Program: APO-AB Council Meeting, Japan

for Industrial Development, Thailand Management System Certification Institute. Among the documents produced were the APO-AB Quality Management System, Rules of Procedure for the APO Accreditation Body, General Requirements for Certification Bodies, and Procedure for Accreditation of Certification Bodies.

APO Productivity Specialists Certification Scheme

This certification scheme will replace the previous APO certification of productivity practitioners available only for participants in the multicountry training course on Development of Productivity Practitioners: Basic and Advanced. A TWG headed by a former MPC Director General and APO Alternate Director for Malaysia developed the new scheme. Known as APO-PS 101 Requirements for Productivity Specialists, the certification scheme was published by the Secretariat in September 2019 to guide NPOs or affiliated organizations in operating the certification program.

APO GP Specialists Certification Scheme

The second area of certification is GP. Similar to the TWG on the Productivity Specialists Certification Scheme, a TWG on GP Specialists Certification reviewed the previous GP practitioners' certification process and developed a new scheme. The TWG is led by the APO Alternate Director for Indonesia and Chairman of the Indonesia Professional Certification Authority. APO-GPS 201 Certification Scheme and Competency Standard for GP Specialists was published in October 2019.

Certification Body Development Program

The CB Development (CBD) Program assists NPOs or affiliated organizations in complying with the requirements for APO CBs. The CBD Program offers consultancy services to develop certification management systems as well as training of trainers and internal assessors. The first development project started in the NPO of Indonesia, which will be accredited as the first APO CB for GP Specialists.

Training of Trainers and Consultants in Green Productivity, ROC

Development of Public-sector Productivity Specialists, Thailand

DIGITAL LEARNING

In 2019, the Secretariat continued to offer self-e-learning courses through its open-source, Moodle-based digital-learning platform, the eAPO. This helps the Secretariat increase its outreach and impact by complementing face-to-face capacity-building projects and training practitioners who are unable attend APO multicountry projects. It will also contribute to the creation of 100,000 trained productivity practitioners as mandated under the Roadmap to Achieve the APO Vision 2020.

During 2019, the Secretariat launched eight new courses and continued 29 previous ones.

Agriculture Courses

Five e-learning courses on smart agriculture were launched under the Advanced Agricultural Management subprogram. They covered Organic Inspection and Certification, Innovative Cost-effective Technologies for Sustainable Agriculture, Modern Food Distribution Systems, Modern Food Storage and Transport Technologies, and Innovations in Agroforestry Systems.

The five courses started from late 2019 and will continue. As of the end of 2019, 312 participants had enrolled in the agriculture courses, of whom 95% were from member countries. A total of 29 had passed the final examination required to receive the APO certificate.

Industry Courses

In line with the Industry Transformation Program of the APO and efforts to promote productivity knowledge, tools, and techniques related to technological advances and innovations on a wider scale within and beyond the Asia-Pacific region, four new industry sector-specific self-learning e-courses were offered during the year. The topics covered diverse areas aimed at creating a pool of professionals who will champion productivity-enhancing support services for industry in member countries such as Basic Data Analytic Course for the Public Sector, Basic Smart Manufacturing 101 in a Blockchain-driven Era, Management Innovation in SMEs, and Critical Strategic Foresight Tools for Sustainable Productivity.

A total of 443 participants registered in all courses, of whom 31 passed the final examination and received the APO certificate. The courses also attracted participants from outside the APO membership.

It will also contribute to the creation of 100,000 trained productivity practitioners as mandated under the Roadmap to Achieve the APO Vision 2020.

Individual Program

SPECIFIC NATIONAL PROGRAM

A well-functioning national productivity ecosystem requires the appropriate institutional setting to reach at least three main target groups: the workforce; enterprises; and emerging growth sectors.

Endeavors to increase institutional capacity must consider multiple requirements from a macro perspective with long-term dimensions. This is in line with the primary role of the APO to contribute to the

After solar PV panel system installation in the APO demonstration project in Indonesia (Off-grid Solar PV Training Project)

Endeavors to increase institutional capacity must consider multiple requirements from a macro perspective with long-term dimensions. This is in line with the primary role of the APO to contribute to the sustainable socioeconomic development of member economies through enhancing productivity and competitiveness.

sustainable socioeconomic development of member economies through enhancing productivity and competitiveness. The APO is also working to strengthen its policy advisory role on productivity through all possible avenues. The objective is not simply improved productivity and national competitiveness but also greater inclusiveness and enhanced well-being of citizens. The latter has particular significance in achieving broad-based productivity improvement, which is also the essence of the concept of sustainable productivity growth.

Since its establishment in 2018, the SNP has provided policy advisory and consultancy projects including their follow-up activities. In 2019, such projects took the form of the Development of National Productivity Master Plans for Cambodia, Fiji, and Bangladesh. The plans are a set of strategies, actions, targets, etc. for achieving higher productivity growth through innovation. The master plans are also tools for mainstreaming productivity in national development agendas. In addition, Development of Institutional Capability Development Plans for NPOs projects strengthen their roles as primary institutions in national productivity ecosystems. Development plans along with related assistance and consultancy activities were completed for the NPOs of Bangladesh and Mongolia in 2019. Those activities under the SNP were adopted in government productivity plans, and the budget support processes for plan execution were underway at the time of writing.

Two other policy advisory projects in Lao PDR and Vietnam on the Development of a National Productivity Master Plan started in mid-2019.

APO demonstration project in India (Smart Manufacturing Transformation Program)

INDIVIDUAL-COUNTRY OBSERVATIONAL STUDY MISSIONS

In 2019, six Individual-country Observational Study Mission (I-OSM) proposals were accepted for implementation, which benefited 55 participants from six member countries: Benchmarking Mission against the Productivity Movement in the ROK from Malaysia to the ROK; Study Mission on SME Development through Innovation and Smart Technology for Entrepreneurs and Startup Businesses from Cambodia to the ROC; Study Mission on Energy Efficiency from Mongolia to Japan; Study Mission and Workshop on Productivity Measurement in MSMEs from the Philippines to Malaysia; Study Mission and Workshop on New Technologies and Ways of Thinking from Singapore to India; and Study Mission on Registered Management Consultants from Malaysia to Singapore.

BILATERAL COOPERATION BETWEEN NPOS

In 2019, six Bilateral Cooperation Between NPO (BCBN) study missions were organized by the APO involving Cambodia, the ROC, Fiji, India, and Vietnam. Twenty-two participants benefited from this program, under which the topics included the Productivity and Innovation Promotion Program, Industry 4.0, Smart Manufacturing, Digital Transformation for Productivity Improvement, Benchmarking, and Agriculture Transformation, among others. The participants were expected to undertake follow-up activities based on the best practices demonstrated and new knowledge gained from the bilateral exchanges between NPOs.

DEMONSTRATION COMPANIES

A number of demonstration projects were concluded in 2019, including the application of material flow cost accounting (MFCA) in manufacturing, food processing, and the hospitality sector in Pakistan and in the leather sector in Bangladesh; applications of smart technologies in automotive parts manufacturing and MFCA-linked lean management in MSMEs in India; digitization of information systems in the health sector in Thailand; and the demonstration of a pilot off-grid photovoltaic (PV) system in Indonesia.

In 2019, five demonstration projects were selected for implementation. The first involved initiation of digitization in the plastic molding processes of a major automotive company in Thailand, Bangkok Metropolis Motor Co., Ltd. The second focused on the adoption of lean manufacturing and quality circles in SMEs in Cambodia, including Cambodia Chemical Supply Co., Ltd., Ly Ly Food Industry Co., Ltd., and LSV Industry Co., Ltd. The third aimed to implement MFCA in three sugar mills of Bangladesh's national sugar production enterprise, the Bangladesh Sugar and Food Industries Corporation. The fourth involved the applications of Green Productivity tools and techniques in the printing industry of Sri Lanka, targeting Wijeya Newspapers Ltd. The fifth aimed to demonstrate off-grid solar PV systems in remote rural areas and disseminate knowledge on solar energy and technologies in Sorong Regency, Indonesia. These five projects were scheduled to be concluded in 2020.

APO demonstration project in Pakistan (Material Flow Cost Accounting)

APO demonstration project in Bangladesh (Material Flow Cost Accounting in the Leather Sector)

APO demonstration project in Indonesia (Off-grid Solar PV Training Project)

TECHNICAL EXPERT SERVICES

In 2019, 29 experts were assigned under the Technical Expert Services (TES) Program. The most experts assigned from within the APO membership were from Japan (four), Malaysia (four), and Singapore (four) and the most from outside it were from Australia (four). Other experts came from Canada (three), the ROC (three), USA (three), UK (two), India (one), and Mexico (one).

Overall, expert services received an average evaluation score of 86 out of 100 for the quality of service provided to members who utilized them. Based on the information provided by NPOs, around 5,300 participants, professionals, and employees benefited through lectures, presentations, consultations, and training conducted under the TES Program.

Institutional Program

INFORMATION AND PUBLIC RELATIONS PROGRAM

APO initiatives under the Information and Public Relations (IPR) Program now go beyond the website, newsletter, and annual report to more proactive, content-led inbound marketing. The approach showcases outcomes through articles and reports demonstrating APO capabilities as well as through more extensive engagement with stakeholders, including the media, using online tools and platforms.

Website and Social Media

In 2019, the website was refreshed and made more responsive. The APO continued to post new contents including digital publications. A revamped Japanese-language page was also readied for launch in early 2020.

The APO continued to utilize social media platforms to inform its followers and the general public of activities and to promote its publications and e-learning courses. Links to theme-specific articles, success stories, and videos expanded outreach. Photos of various projects implemented in APO member countries were also posted on social media to attract a wide audience in the host countries and elsewhere.

Collateral Materials

A two-minute corporate video, "Pushing the Frontiers of Productivity," was produced in 2019 to showcase APO endeavors for productivity improvement. It can be accessed on the website and serves as a quick overview of the APO and its mission.

An updated brochure summarizing APO activities was also released. To ensure greater APO visibility when distributing information materials, new folders were specially designed. The annual APO desk calendar, which continued to be popular within and outside the membership, was printed on ecofriendly paper certified by the Forest Stewardship Council and featured a recycling theme.

Media Relations

Throughout 2019, the APO continued efforts to improve collaborative relations with the media, particularly in Japan. The APO was cited in a total of 2,337 media reports.

In addition to its official website and social media presence, the APO took advantage of online wire services for greater media exposure when issuing selected press releases. Such occasions included announcements of the handing over of the Strategic National Productivity Master Plans for Bangladesh and Fiji, the newly appointed APO Secretary-General, and the publication of the *APO Productivity Databook 2019*. That wire service coverage reached a wide global audience with an estimated media value of USD410,000.

APO Honorary Fellows

Since 1978, the title of APO Honorary Fellow has been conferred by the APO Governing Body on former APO Directors, Alternate Directors, NPO Heads, Secretaries-General, or APO Liaison Officers in recognition of their outstanding contributions to the organization. Based on guidelines set by the APO Governing Body at its 19th Session held in 1977, seven individuals were approved by the APO Chair, First Vice Chair, and Second Vice Chair for conferment of the title of APO Honorary Fellow in 2019 (listed in national alphabetical order):

Former APO Alternate Director and NPO Head for Bangladesh
S.M. Ashrafuzzaman

Former NPO Head for Cambodia
Heng Eang

Former Director for Lao PDR
Somdy Inmyxai

Former Director for Malaysia
Azman Hashim

Former APO Alternate Director and NPO Head for Malaysia
Mohd. Razali Hussain

Former APO Alternate Director and NPO Head for Vietnam
Nguyen Anh Tuan

Former APO Secretary-General
Dr. Santhi Kanoktanaporn

Publications

During 2019, the Secretariat published 15 books and reports. In addition, a trainer's manual was also developed, targeting participants who passed the exam to qualify as foresight trainers under the Strategic Foresight Initiative. A new educational video on strategic planning was also produced to be shared with NPOs in early 2020. The Secretariat continued regular publication of the e-version of the *APO News* distributed as an electronic digital mailer. The following books and reports appeared in 2019.

Books

- *APO Productivity Databook 2019*
- *Agricultural Productivity in Asia: Measures and Perspectives 2019*

Program Reports and Research and Resource Papers

- *Advancing Youth Employment*
- *APO Agricultural Transformation Framework*
- *Blue Ocean Strategy: Making the Public Sector More Customer Centric*
- *Education Reform for the Future of Work: The Shift to a Knowledge Society*
- *Gearing up to Industry 4.0: Digitization Strategies for SMEs*
- *Making the Most of Human Capital: Diversity and Inclusion Strategies in Selected APO Member Economies*
- *Measuring Public-sector Productivity: A Practical Guide*
- *Productivity in Welfare Service Industry—Measuring Productivity in Health and Education: An Exploratory Study of Selected APO Countries*
- *Regulatory Management Framework to Enhance Productivity*
- *Riches at the Base of the Pyramid: Alleviating Poverty with Green Productivity and Sustainability*
- *The Future is Now: APO Quarterly Emerging Trend Report* (three issues)

Special Manual

- *Strategic Foresight Scenario Planning: A Trainer's Manual*


AGRICULTURAL PRODUCTIVITY IN ASIA
MEASURES AND PERSPECTIVES 2019
ADVANCING YOUTH EMPLOYMENT
MEASURING PUBLIC-SECTOR PRODUCTIVITY
A PRACTICAL GUIDE
The Future is Now
APO PRODUCTIVITY DATABOOK 2019
GEARING UP TO INDUSTRY 4.0
DIGITIZATION STRATEGIES FOR SMEs
MAKING THE MOST OF HUMAN CAPITAL
Diversity and Inclusion Strategies in Selected APO Member Economies
RICHES AT THE BASE OF THE PYRAMID
ALLEVIATING POVERTY WITH GREEN PRODUCTIVITY AND SUSTAINABILITY
PRODUCTIVITY IN WELFARE SERVICE DELIVERY

INFORMATION TECHNOLOGY PROGRAM

Change continues to be a characteristic of technology, with IT at the forefront of advances. It is important for the APO to make full use of IT to cope with the changes and challenges of the dynamic digital world as well as to deliver better value to stakeholders. With member economies increasingly adopting digital approaches to implement productivity initiatives, the Secretariat established a new IT infrastructure and communications backbone in 2019. In keeping with global trends, the Secretariat continued setting up a remote workplace environment, strengthening its cloud infrastructure with more features, and tightening cybersecurity.

On the maintenance front, the Secretariat continued to support the use of a few legacy IT systems, including those for project management and APO accounting and budget management, which are critical for day-to-day operations and business continuity.

ERP initiative

The adoption of a Secretariat-wide ERP was initiated in 2017 with the objective of migrating all key administrative and operational functions to a single database-driven process environment. The integrated platform will not only help the Secretariat improve its document management but also help avoid multiple versioning, thereby bringing consistency in documentation across different departments. It will enable the APO to work more efficiently by eliminating the need for paper-based documents while reducing the organization's ecological footprint. Access to uniform data and information will facilitate faster analysis and more efficient decision making.

During 2019, the Secretariat continued the development of the ERP system, pilot-tested the DMS and PMS, and conducted training sessions during the Liaison Officers' Meeting in Tokyo as well as for Secretariat staff. Feedback received on the ERP will be incorporated on a priority basis. Work on the finance module and connecting it to the PMS started and was expected to be completed within 2020. The new system will serve as the foundation of the APO's digital infrastructure, integrating processes among different functions within the Secretariat and with other stakeholders including participants, resource persons, and Liaison Officers.

IT infrastructure improvement initiative

The IT infrastructure previously in use was affected by a fire that occurred in the office building on 12 March 2019. Fortunately, there were no injuries, but the Secretariat floor, including IT and internal network hardware, sustained water damage, requiring relocation to temporary office space.

During 2019, the Secretariat replaced the outdated and water-damaged IT infrastructure with network optimization techniques including a remote-working environment. The data center was also moved to a new location, which decreased overall IT operational costs while providing better support facilities and services. The Secretariat upgraded the VPN system so that staff can work remotely without business disruptions.

Cybersecurity

Cybersecurity is a fast-shifting battlefield that requires awareness, continuous observance, and a combined response from everyone involved. At the end of 2019, the Secretariat introduced a new cloud-based firewall system with all-around protection for the replaced IT infrastructure, updated the Wi-Fi network with a more secure tracking environment for Secretariat staff/guests, and added the latest smart-scan, predictive machine learning-based security and antivirus system. Cybersecurity efforts will continue, and the Secretariat plans to introduce additional platforms for stakeholders.

INTERNATIONAL COOPERATION

The International Cooperation Program contributes to expanding the pool of experts and resources for APO activities. It also provides member countries with opportunities to establish bilateral business ties and networks with counterparts in the region and elsewhere. The APO as a whole, its member countries, and its partners in cooperation all derive benefits from the synergies created.

Nonmembers

Turkey

In July 2019, the APO Secretary-General and Minister of Industry and Technology of the Republic of Turkey met in Ankara to discuss the needs and expectations of Turkey after it became a full member.

Myanmar

The APO has supported Myanmar its programs for nonmembers for many years and continued to explore opportunities for further collaboration in 2019 focusing on a national productivity master plan and projects related to postharvest technologies in agriculture.

International Organizations/Academia

The APO continues to partner with international organizations and reputable universities to build synergy through projects that generate complementary impacts and benefits.

OECD

The APO and OECD conduct joint research on productivity measurement, including labor input measurement, capital measurement, multifactor productivity sensitivity testing, etc.

Korea Development Institute (KDI)

The APO developed the National Productivity Master Plan for Vietnam with support from the KDI.

Former APO Secretary-General Dr. Santhi Kanoktanaporn (C) visits Turkey to meet Turkish Deputy Minister of Industry and Technology Dr. Çetin Ali Dönmez (3rd R).

iPlast 4.0

iPlast 4.0 collaborated with the APO to promote innovative digitalization and smart manufacturing in Asia. With the expertise and support of iPlast 4.0, a demonstration company project was initiated in Thailand in 2019 to digitize the molding process of a major automotive company. This experience will serve as a good reference for other manufacturers undertaking digital upgrading to improve productivity.

Graduate School of Public Policy, University of Tokyo (GraSPP)

The Secretariat accepted four student interns from GraSPP to provide policy-oriented learning opportunities. The students gained experience through projects, research assignments, and exchanges of information.

Keio University

The annual *APO Productivity Databook* has been published since 2008 with support from a team of experts at the Keio Economic Observatory, Keio University, in Tokyo.

Cornell University

In 2019, cooperation in efforts related to the agriculture sector with Cornell University of the USA was successfully completed. A research paper on Innovative Institutions to Accelerate Agroindustry Development in Asia will be available in 2020 to evaluate selected examples of innovative institutions in the APO region.

Onsite Evaluation of 2018 Projects

Throughout 2018, the APO carried out 50 multicountry projects attended by 1,691 participants. They comprised 15 training courses, 19 workshops, eight observational study missions, and eight conferences, which were evaluated in 2019. Approximately 80% of all participants who attended the 2018 projects included in this evaluation gave feedback through questionnaires, in which 57% indicated that the projects were "more than expected," while around 42% found them "as expected." The greatest satisfaction level was with the quality of resource persons, program contents, and physical arrangements at project venues.

The feedback showed that the level of satisfaction with 2018 APO multicountry projects had increased in comparison with the 2017 results. Specifically, in the overall evaluation, 57% responded "more than expected," showing a 2% increase from 2017. The "less than expected" response rate remained at 1%. This indicates that the majority of participants in 2018 multicountry projects felt that the projects had exceeded or met their expectations. Participants' satisfaction with resource persons increased from 60% in 2017 to 64% in 2018. The increase in the overall level of satisfaction in 2018 was mainly due to the 3% increase in satisfaction with time allocation as well as 4% increase in satisfaction with resource persons in the category "more than expected," which has recorded a steady increase since 2016. Time management and program schedule could explain the decrease in the "as expected"

category. The three most improved areas in the "more than expected" rating were quality of resource persons, time management, and time allocation.

The resource persons highlighted participants' level of engagement in the discussions/exercises and interest in the topics as main high points. Several commented that the participants were active and demonstrated good attention, high levels of comprehension, and knowledge of the topics. Resource persons also made positive comments on country papers, stating that they were well prepared and well presented. Aside from the program content, resource persons rated the physical arrangements as generally good. The main low points pointed out by resource persons concerned time duration/management, site visits, and the English proficiency of participants. They indicated that more time should be allocated for case study/group work exercises. There were also several suggestions on conducting site visits allowing learning from institutional practices. The need to follow up the action plans of participants was suggested.

In attempting to expand the impact of the projects, the Secretariat established a Participant Selection Committee to ensure their suitability and potential to create

multiplier effects. The time spent on the selection process has decreased, and the utilization of a digital platform for managing projects including postproject activity monitoring and evaluation will enhance overall quality.

Evaluations of videoconference-based (VC) courses showed that about one-third of participants found them to be "more than expected," while the rest rated them "as expected." The "more than expected" rating was the lowest level compared with previous years. In 2018, the percentage of participants indicating dissatisfaction with the courses was the same as in 2017. This indicates a decrease, since there were significantly fewer participants than in the previous year. The most positive feedback from participants was for time allocation and program contents. Many participants reported that they had learned new things, implying that the topics met demand. The design of the courses was appreciated, including good logistical preparations by NPOs and VC center staff.

Related to the low points, participants hoped that improvements in VC courses in the future would enable:

1. Tracking of follow-up actions by participants;
2. Incorporating more success stories from advanced countries;
3. Including interactive group-based exercises in the sessions; and
4. Better IT facility connectivity.

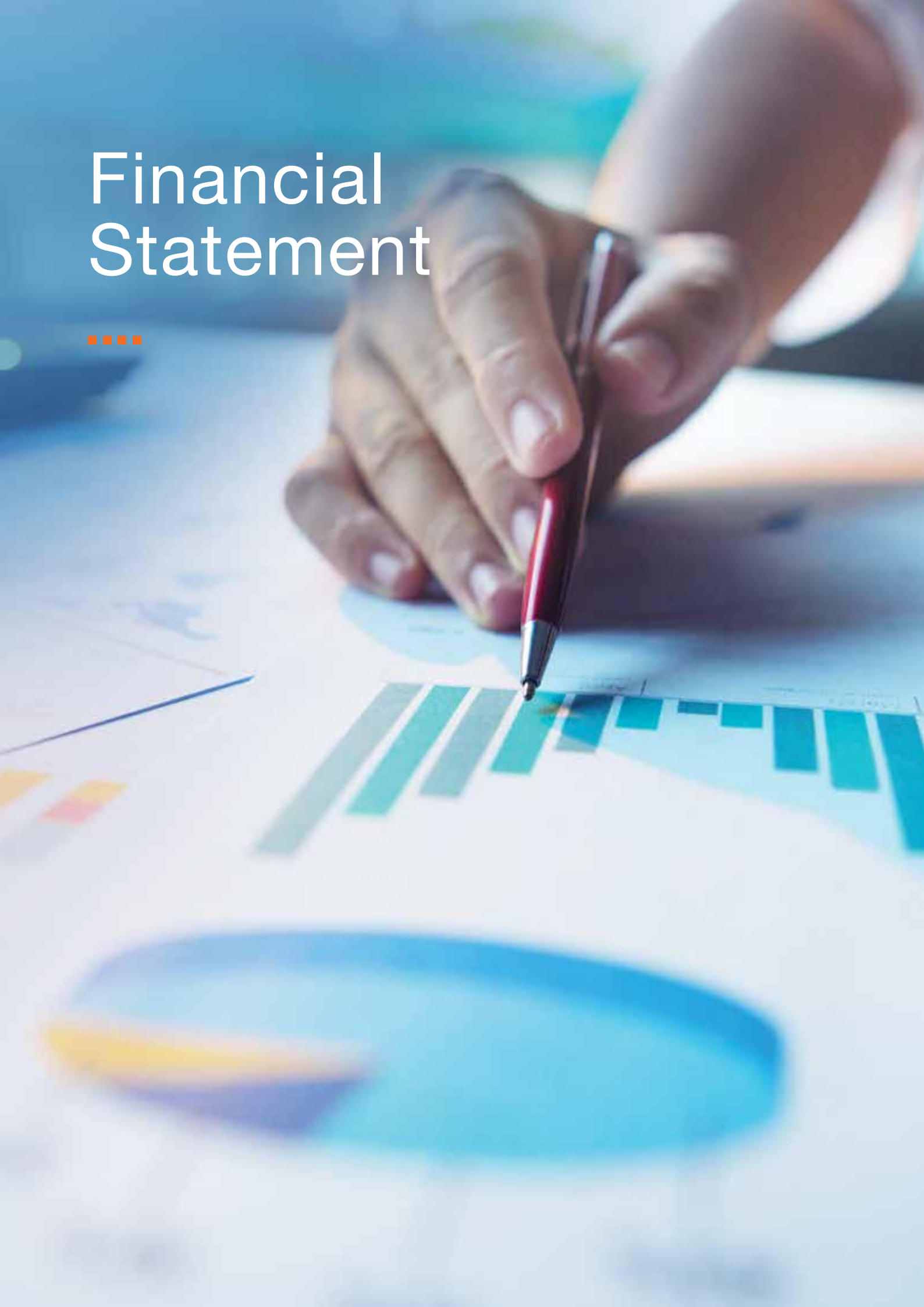
Resource persons found constraints in terms of time and physical interactions difficult to manage, particularly with the diversity of participants' experience, knowledge, areas of expertise, etc.

In response to the feedback from participants, resource persons, and implementing organizations on improving VC courses, courses are now announced on social media. Schedules are structured to provide more time for group discussions and online interactions among participants and resource persons. Resource persons are requested to incorporate more case studies relevant to the topics. Concerning issues related to poor video quality and weak connectivity, the Secretariat sought the assistance of liaison officers and project coordinators to identify better alternative service providers in their countries.

In 2018, the APO implemented 75 in-country projects delivered by 67 international experts and attended by around 5,500 participants, which were evaluated in 2019. There are seven types of in-country projects: Individual-country Observational Study Missions (I-OSMs); Technical Expert Services (TES); Bilateral Cooperation Between NPOs (BCBN); Demonstration Company Projects (DMPs); Development of NPOs (DON); National Follow-up Projects (NFPs); and Specific National Program (SNP). For I-OSMs, although close monitoring of follow-up activities is still needed, no significant problems in implementation were reported. Both host and dispatching countries were efficient in preparing for and coordinating the missions. The main issues in implementing TES were related to the nonsubmission of evaluation reports, although that improved somewhat in 2018. Greater emphasis on the submission of TES evaluation reports to assess the results is still needed.

Related to the organization of BCBN, participating NPOs should be clear about the purpose of visits by specifying areas to be studied. The DMP projects carried out in 2018 suggested that NPOs need to ensure proactive participation of the demonstration companies and avoid last-minute withdrawals or changes in companies and schedules. NPOs are also encouraged to respond promptly and plan for dissemination activities and materials. Evaluations of DON projects indicated the need to increase the efficiency of communication and coordination before and during the implementation phase. From the observation of the efficiency of NFPs, the relatively long time required for preparation may need to be addressed. This was due to various reasons such as the internal coordination processes by NPOs and related agencies as well as the time to identify appropriate resource persons. As a result of SNP projects implemented in Cambodia and Fiji throughout 2018, the productivity master plans developed were officially adopted by their governments, showing the success of those projects.

Financial Statement



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Independent Auditor's Report

To the Governing Body of Asian Productivity Organization

Our opinion

In our opinion, Asian Productivity Organization (the "Organization")'s financial statements present fairly, in all material respects the financial position of the Organization as at 31 December 2019, and its financial performance and its cash flows for the year then ended in accordance with International Financial Reporting Standards.

What we have audited

The Organization's financial statements comprise:

- the statement of financial position as at 31 December 2019;
- the statement of revenues or expenses and other comprehensive income for the year then ended;
- the statement of changes in surplus for the year then ended;
- the statement of cash flows for the year then ended; and
- the notes to the financial statements, which include a summary of significant accounting policies.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing ("ISA"). Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Organization in accordance with the International Ethics Standards Board for Accountants' Code of Ethics for Professional Accountants (IESBA Code) and the ethical requirements that are relevant to our audit of the financial statements in Japan. We have fulfilled our other ethical responsibilities in accordance with the IESBA Code and the ethical requirements in Japan.

PricewaterhouseCoopers Aarata LLC
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Other information

Management is responsible for the other information. The other information comprises the annual report (but does not include the financial statements and our auditor's report thereon), which is expected to be made available to us after the date of this auditor's report.

Our opinion on the financial statements does not cover the other information and we will not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information identified above when it becomes available and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

When we read the annual report, if we conclude that there is a material misstatement therein, we are required to communicate the matter to those charged with governance.

Responsibilities of management and those charged with governance for the financial statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with International Financial Reporting Standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Organization's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Organization or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization's financial reporting process.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISA will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

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As part of an audit in accordance with ISA, we exercise professional judgment and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Organization's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

PricewaterhouseCoopers Sanata LLC

13 March 2020

ASIAN PRODUCTIVITY ORGANIZATION
STATEMENTS OF FINANCIAL POSITION
31 DECEMBER 2019 AND 31 DECEMBER 2018

(US dollars)

	2019	2018
ASSETS		
Cash and cash equivalents (Note 3)	$25,117,378	$28,063,697
Receivables (Note 4):		
Member countries	4,333,603	2,458,723
Others	5,693	6,895
Prepaid expenses	48,162	105,450
Deposits and other advance payments	208,291	57,985
Total current assets	29,713,128	30,692,750
Fund for severance payments (Note 11)	276,566	270,067
Property, plant and equipment (Note 5):		
Structure	119,591	349,440
Equipment	70,640	180,840
Automobile	72,935	72,935
Others	6,442	189,895
Right of use assets (Note 13)	628,352	-
Accumulated depreciation	(467,980)	(555,026)
Construction in progress	41,931	-
Intangible assets (Note 5)	531,133	217,502
Total noncurrent assets	1,279,610	725,653
Total assets	$30,992,738	$31,418,403
LIABILITIES AND SURPLUS		
Accounts payable	$2,504,665	$1,930,982
Withholding tax and social insurance	9,459	23,699
Other current liabilities (Note 8)	7,189,915	7,557,334
Total current liabilities	9,704,038	9,512,015
Accrued annual leave (Note 6)	643,348	633,397
Liability for severance payments (Note 12)	2,464,235	2,333,081
Lease liabilities (Note 13)	385,606	-
Other noncurrent liabilities	119,591	90,046
Total noncurrent liabilities	3,612,779	3,056,524
Total liabilities	13,316,818	12,568,539
Surplus:		
Appropriated for		
Working capital fund	6,000,000	6,000,000
Contingency fund (Note 2)	500,000	500,000
Continuing projects	3,333,976	4,900,197
Unappropriated surplus (Note 15)	7,920,085	7,511,650
Accumulated other comprehensive income (Note 12)	(78,141)	(61,983)
Total surplus	17,675,920	18,849,864
Total liabilities and surplus	$30,992,738	$31,418,403

The accompanying notes are integral part of these statements.

ASIAN PRODUCTIVITY ORGANIZATION
STATEMENTS OF REVENUES OR EXPENSES AND OTHER COMPREHENSIVE INCOME
YEARS ENDED 31 DECEMBER 2019 AND 2018

(US dollars)

	2019	2018
Revenues:		
Membership contributions (Note 7)	$11,986,035	$11,986,035
Special cash grants (Note 8)	612,262	1,901,864
Mandatory contribution for rent (Note 9)	246,155	230,778
Participation by member countries	3,454	4,236
Miscellaneous	124,322	52,958
Total revenues	12,972,228	14,175,871
Expenses:		
Projects		
Current year's project costs:		
APO share	4,167,637	3,905,720
Subtotal	4,167,637	3,905,720
Prior years' continuing project costs:		
APO share	3,408,261	2,828,597
Subtotal	3,408,261	2,828,597
Allocation to project costs from		
Administration expenses (Note 10)	1,566,587	1,571,790
Total	9,142,485	8,306,107
Administration		
Staff expenses (Note 12 and 17)	4,666,978	4,633,794
Office maintenance (Note 17)	547,739	272,870
Depreciation expenses (Note 5 and 13)	159,840	61,246
Operations	67,702	69,586
Miscellaneous (Note 17)	225,123	201,166
Allocation to project costs (Note 10)	(1,698,929)	(1,719,464)
Total	3,968,453	3,519,198
Exchange (gain)/loss	(8,272)	(152,760)
Increase (decrease) in loss allowance (Note 4)	860,573	164,634
Total	852,301	11,874
Total expenses	13,963,239	11,837,178
Net adjustment for closed projects (Note 14)	166,774	(15,434)
Excess of revenues over expenses	(1,157,786)	2,354,127
Other comprehensive income (loss):		
Pension liability adjustments (Note 12)	(16,158)	148,883
Total other comprehensive income (loss)	(16,158)	148,883
Total comprehensive income (loss)	($1,173,944)	$2,503,010

The accompanying notes are integral part of these statements.

ASIAN PRODUCTIVITY ORGANIZATION

STATEMENTS OF CHANGES IN SURPLUS

YEARS ENDED 31 DECEMBER 2019 AND 2018

(US dollars)

	Appropriated for					
	Working capital fund	Contingency fund	Continuing projects	Unappropriated	Accumulated other comprehensive income	Total
2018						
Surplus as of 1 January 2018	$6,000,000	$500,000	$4,398,306	$5,659,414	($210,866)	$16,346,854
Excess of revenues over expenses	-	-	-	2,354,127	-	2,354,127
Transfer to continuing projects	-	-	501,891	(501,891)	-	-
Pension liability adjustment (Note 12)	-	-	-	-	148,883	148,883
Surplus as of 31 December 2018	$6,000,000	$500,000	$4,900,197	$7,511,650	($61,983)	$18,849,864
2019						
Excess of revenues over expenses	-		-	(1,157,786)	-	(1,157,786)
Transfer to continuing projects	-	-	(1,566,221)	1,566,221	-	-
Pension liability adjustment (Note 12)	-	-	-	-	(16,158)	(16,158)
Surplus as of 31 December 2019	$6,000,000	$500,000	$3,333,976	$7,920,085	($78,141)	$17,675,920

The accompanying notes are integral part of these statements.

ASIAN PRODUCTIVITY ORGANIZATION
STATEMENTS OF CASH FLOWS
YEARS ENDED 31 DECEMBER 2019 AND 2018

(US dollars)

	2019	2018
Cash Flows from Operating Activities:		
Excess of revenues over expenses	($1,157,786)	$2,354,127
Adjustments:		
Depreciation and amortization	195,867	126,642
Provision for losses on accounts receivable	860,573	164,634
Interest income	(117,708)	(48,882)
Exchange variance	67,919	(275,827)
Decrease (increase) in receivables from member countries	(2,734,714)	5,608,333
Decrease (increase) in receivables - others	463	(5,145)
Decrease (increase) in other current assets	(93,018)	(56,640)
Decrease (increase) in funds for severance payments	(6,499)	(8,649)
Disposal (purchase) in property, plant and equipment	(300,785)	(250,395)
Increase (decrease) in accounts payable	573,683	148,310
Increase (decrease) in other liabilities	(348,641)	(1,697,750)
Increase (decrease) in accrued annual leave	9,950	953
Increase (decrease) in liability for severance payments	114,997	(35,257)
Subtotal	(2,935,700)	6,024,453
Interest received	117,708	48,882
Net cash flow from operating activities	(2,817,992)	6,073,335
Cash Flows from Financing Activities:		
Payment of lease liabilities	(60,408)	-
Net cash flow from financing activities	(60,408)	-
Effect of exchange rate changes on cash and cash equivalents	(67,919)	275,827
Net increase (decrease) in cash and cash equivalents	(2,946,319)	6,349,162
Cash and cash equivalents at beginning of year	28,063,697	21,714,534
Cash and cash equivalents at end of year (Note 3)	$25,117,378	$28,063,697

The accompanying notes are integral part of these statements.

ASIAN PRODUCTIVITY ORGANIZATION

NOTES TO FINANCIAL STATEMENTS

1. Organization, business, and source of funding

The Asian Productivity Organization (the "Organization" or "APO") is an intergovernmental regional organization established in 1961 by several governments in Asia with its headquarters in Tokyo, Japan, and continues to operate from this location. The Organization is nonpolitical, nonprofit making, and nondiscriminatory.

The objective of the Organization is to increase productivity and thereby accelerate economic development in Asia through mutual cooperation among member countries. To fulfill its objective, the Organization institutes programs for the development of productivity, provides information and advice for productivity improvement, and promotes and disseminates modern productivity skills and techniques in the agriculture, industry, and service sectors.

The Organization membership is open to all Asian and Pacific governments that are members of the United Nations Economic and Social Commission for Asia and the Pacific. From 1 July 1997, the Hong Kong Productivity Council was instructed to cease all APO activities when sovereignty was transferred to the People's Republic of China.

The Organization performs activities in cooperation with national productivity organizations (NPOs) and other international organizations. NPOs in member countries that deal with productivity activities at the national level act as implementing agencies for the Organization's projects and nominate participants from their countries to attend those projects.

The budget of the Organization is composed of the budget covering the program of action of the Organization and staff, administrative, and nonproject expenses. The Governing Body, which is the supreme organ of the Organization, meets once a year to decide on policy matters concerning program and budget, finances, and membership. The sources for the budget are:

a) Annual membership contributions based on gross national income;
b) Special cash grants given by member governments and external assistance from cooperating agencies and institutions;
c) Project implementation grants given by member governments that host projects and other governments and organizations that organize projects jointly with the Organization; and
d) Miscellaneous income such as proceeds from interest income.

2. Significant accounting policies

(1) Basis of preparation of accompanying financial statements

a) Compliance with IFRS
The financial statements of the Organization are prepared based on the Convention and the Financial Regulations established by the APO, which is in line with International Financial Reporting Standards ("IFRS").

b) Historical cost conversion
The financial statements of the Organization are prepared on a historical cost basis, except for certain financial assets and liabilities which are measured at fair value.

c) Changes in accounting policies
The Organization has applied the following standard and amendment for the first time for its annual reporting period commencing 1 January 2019:

- IFRS 16 Leases

(2) Receivables

Receivables are recognized initially at fair value and subsequently measured at amortized cost using the effective interest method, less loss allowance.

(3) Property, plant and equipment and intangible assets

Property, plant and equipment and intangible assets consist of the furniture and fixtures, building improvements, structures and equipment. The Organization books on the statements of financial position for the items whose acquisition cost amount is significant.

Depreciation is calculated to write off the cost of items of property, plant and equipment and intangible assets using the straight-line method over their estimated useful lives, and is recognized in profit or loss.

The estimated useful lives of the property, plant and equipment and intangible assets are as follows:

- Structure: 5–8 years
- Equipment: 5–8 years
- Automobile: 6 years
- Software: 5 years
- Others: 5–10 years

Depreciation methods and useful lives are reviewed at each reporting date and adjusted if appropriate.

(4) Fund for severance payments

The fund for severance payments includes an insurance endowment fund and is stated at fair value. The fair values of the fund for severance payments are estimated based on values quoted by financial institutions.
IFRS 7 "Financial Instruments—Disclosures" defines fair value and establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The three levels of the fair value hierarchy are as follows:
Level 1: Quoted prices (unadjusted) in active markets for identical assets or liabilities
Level 2: Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly
Level 3: Unobservable inputs for the asset or liability
The insurance endowment fund held by the Organization is classified into Level 2 assets.

(5) Liability for severance payments

Staff members terminating their employment with the Organization are entitled, under most circumstances, to severance payments based upon the monthly basic pay at the time of termination of

employment and years of service. The cost of the severance payments is determined using the Projected Unit Credit Method, with actuarial valuations being carried out at the end of each reporting period. Remeasurements of the Organization's defined benefit obligation, which comprise actuarial gains and losses are recognized immediately in other comprehensive income.

(6) Accrued annual leave

Based on Rule 5.01 of APO Staff Regulation V, annual leave is accumulated up to 90 days, which does not expire until leaving the Organization. In 2019, the Organization recorded accrued annual leave of 68 days (68 days in 2018) for staff members who had annual leave of more than 68 days as a liability, since the unused accrued annual leave up to 60 days is paid by a sum of money equivalent to their salary for the period of the accrued annual leave upon separation from the Organization, and in consideration of the possible utilization of unused accrued annual leave in excess of 60 days upon separation.

(7) Revenues

Major sources of revenues of the Organization are membership contributions and special cash grants, among others. Membership contributions, which are approved by the Session of the Governing Body (GBM), are recognized as revenues on 1 January of each fiscal year. Special cash grants are recognized as revenues over the period necessary to match them with the costs that they are intended to compensate.

(8) Appropriation for working capital fund

Based on Regulation 7 of the Financial Regulations, a working capital fund is established from which advances may be made to finance budgetary appropriations to the extent that this is necessary in anticipation of pledged but unpaid contributions.
Based on the decision in the 54th GBM, the Organization has set up a contingency fund amounting to $500,000.

(9) Appropriation for continuing projects

The outstanding balance of commitments for continuing projects at year-end, which has been funded mainly from membership contributions and special cash grants, is appropriated for continuing projects. The balance for continuing projects funded from special cash grants includes unspent balances of special cash grants, which are balances generated from completion of some projects prior to the year-end being reallocated for the following year's projects in the same programs.

(10) Translation of foreign currencies

For the purpose of the financial statements, the results and financial position of the Organization are expressed in US dollars, which is the functional currency of the Organization and presentation currency for the financial statements. The Organization's books of account are maintained both in Japanese yen and US dollars. Assets and liabilities denominated in Japanese yen are translated into US dollars at the appropriate exchange rate on the statements of financial position date. For revenue and expense accounts, average rates for the prior month of the transactions are applied. Revenue and expense accounts of other currencies except Japanese yen are translated into US dollars at the rates prevailing at the time of the transactions. The resulting unrealized gain/loss from translation is included in exchange gain/loss in the statement of revenues or expenses and other comprehensive income.

(11) Taxes

The Organization is exempt from direct taxes on assets or income and from customs duties.

(12) Use of estimates

The Organization makes estimates and assumptions to prepare the financial statements. Such estimates and assumptions affect the reported amounts of assets, liabilities and expenses. Actual results could differ from those estimates.

3. Cash and cash equivalents

Cash and cash equivalents include all highly liquid investments, generally with original maturities of three months or less, which are readily convertible to known amounts of cash and are so near maturity that they present insignificant risk of changes in value because of changes in interest rates. Money market funds, which are treated as cash and cash equivalents except for specific use of the funds for severance payments, are carried at cost plus accrued interest.

Cash and cash equivalents	2019	2018
Current Deposits	$18,985,445	$25,931,563
Time Deposits	6,131,933	2,079,222
MMF	0	52,912
Total	$25,117,378	$28,063,697

4. Receivables of membership contributions, participating country expenses, and others

Receivables	2019	2018
Membership contributions	$7,310,225	$4,575,512
Participating country expenses	5,556	5,918
Others	3,964	4,064
Loss allowance	(2,980,449)	(2,119,876)
	$4,339,296	$2,465,618

Receivables represent uncollected revenue from membership contributions, participating country expenses, and others. Membership contributions approved by the GBM are to be paid to the Organization from each member as soon as possible after the receipt of such advice according to Regulation 6 of the Financial Regulations.

The Organization has receivables that are subject to the expected credit loss model and applies the IFRS 9 simplified approach to measuring expected credit loss which uses lifetime expected loss allowance for the receivables.

31 December 2019	Current	More than 1 year overdue	Total
Expected loss rate	0%	100%	
Gross carrying amount - receivables	$4,339,296	$2,980,449	$7,319,745
Loss allowance	-	$2,980,449	$2,980,449

31 December 2018	Current	More than 1 year overdue	Total
Expected loss rate	0%	100%	
Gross carrying amount - receivables	$2,465,618	$2,119,876	$4,585,494
Loss allowance	-	$2,119,876	$2,119,876

The closing loss allowance for receivables for the year ended 31 December 2019 and 2018 reconcile to the opening loss allowance as follows:

	2019	2018
Opening loss allowance as of 1 January	$2,119,876	$1,955,242
Increase in loss allowance recognized in profit or loss during the year	860,573	527,302
Unused amount reversed	-	(362,668)
31 December	$2,980,449	$2,119,876

Loss allowance is maintained for potential credit losses based upon the assessment of the receivables aging, taking into consideration any circumstances regarding member's inability to meet its financial obligations. The Organization's exposure to credit risk is influenced mainly by the individual characteristics of each member country. The loss allowance for the receivables overdue for one year and longer amounts to $2,980,449, which includes the receivable of $1,472,882 from Iran for membership contributions of 2016, 2017, and 2018, and a long-outstanding receivable of $248,125 from Hong Kong since 31 December 1999 after the transfer of sovereignty. The maximum exposure to credit risk is represented by the carrying amount of receivables.

5. Property, plant and equipment and intangible assets

Movements in property, plant and equipment and intangible assets for the year ended 31 December 2019 were as follows:

	Structure	Equipment	Automobile	Others	Total	Construction in Progress	Software
Cost							
On 1 January 2019	$349,440	$180,840	$72,935	$189,895	$793,111	-	$306,096
Additions	-	27,324	-	-	27,324	$41,932	357,013
Disposals	(229,850)	(137,524)	-	(183,453)	(550,827)	-	-
On 31 December 2019	119,591	70,640	72,935	6,442	269,608	41,932	663,108
Accumulated depreciation							
On 1 January 2019	278,651	146,869	59,766	69,738	555,025	-	88,594
Depreciation	33,213	26,339	12,156	20,370	92,078	-	43,381
Disposals	(206,729)	(131,084)	-	(87,531)	(425,344)	-	0
On 31 December 2019	105,135	42,125	71,922	2,577	221,759	-	131,975
Net Book value							
On 1 January 2019	70,789	33,971	13,169	120,156	238,085	-	217,502
On 31 December 2019	$14,456	$28,515	$1,013	$3,865	$47,849	$41,932	$531,133

The total depreciation amount of $135,459 for 2019 was recognized, including $74,213 as project costs and $61,246 as administration expenses.

The structure, equipment, and others were disposed due to the demolition of the APO Secretariat office in 2019, by which the assets cost of $550,827 and the accumulated depreciation of $425,344 were written off and the disposal loss of $125,483 was recorded, including $75,936 as project costs and $49,547 as administration expenses.

Movements in property, plant and equipment and intangible assets for the year ended 31 December 2018 were as follows:

	Structure	Equipment	Automobile	Others	Total	Construction in Progress	Software
Cost							
On 1 January 2018	$349,440	$180,840	$72,935	$93,175	$696,391	-	$152,420
Additions	-		-	96,720	96,720	-	153,675
Disposals	-	-	-	-	-	-	-
On 31 December 2018	349,440	180,840	72,935	189,895	793,111	-	306,096
Accumulated depreciation							
On 1 January 2018	245,438	124,629	47,611	50,873	468,551	-	48,427
Depreciation	33,213	22,240	12,156	18,865	86,475	-	40,167
Disposals	-	-	-	-	-	-	-
On 31 December 2018	278,651	146,869	59,766	69,738	555,025	-	88,594
Net Book value							
On 1 January 2018	104,003	56,211	25,325	42,301	227,840	-	103,993
On 31 December 2018	$70,789	$33,971	$13,169	$120,156	$238,085	-	$217,502

The total depreciation amount of $126,642 for 2018 was recognized, including $65,396 as project costs and $61,246 as administration expenses.

6. Accrued annual leave

Movements in accrued annual leave for the year ended 31 December 2019 were as follows:

On 1 January 2019	$633,397
Additional accrual during the year	80,630
Payments made during the year	(77,388)
Reclassified to Payable	-
Foreign exchange movements	6,708
On 31 December 2019	$643,348

Movements in accrued annual leave for the year ended 31 December 2018 were as follows:

On 1 January 2018	$632,444
Additional accrual during the year	113,451
Payments made during the year	(68,013)
Reclassified to Payable	(56,111)
Foreign exchange movements	11,626
On 31 December 2018	$633,397

7. Membership contributions

The apportionment of total membership contributions for 2019/2020 was based on the long-term permanent membership contribution formula based on the six-year average GNI as approved by the 60th GBM held in May 2018. There are no unfulfilled conditions or other contingencies attaching to these contributions.

8. Special cash grants

Special cash grants are used for specific programs and other administrative expenses for which member governments are encouraged to cooperate with the APO in addition to their membership contributions. There are no unfulfilled conditions or other contingencies attaching to these grants. The Organization will recognize special cash grants received from Government of Japan as revenues over the period necessary to match them with the costs that they are intended to compensate. Unrecognized revenue balances for the year ended 31 December 2019 and 2018 were $7,127,001 and $7,501,151, respectively and were included in other current liabilities.

The detailed amounts of the special cash grants for the years ended 31 December 2019 and 2018 were as follows:

Purpose of grants	2019	2018
Project costs	$612,262	$1,901,864
	$612,262	$1,901,864

9. Mandatory contribution for rent

The new lease contract for the APO Secretariat Office from 1 April 2019 to 31 Mach 2021 was signed at the rate of $246,693 (JPY27,136,260) per year with an 8.85% increase and shall be borne by the host government, the Government of Japan. This amount is to be considered as a mandatory contribution of the host government, distinct and separate from its annual membership contribution to the APO.

10. Allocation to project costs

The Organization allocated administration expenses which are directly or indirectly related to project activities to project costs.

11. Fund for severance payments

The balances of the fund for severance payments represent the amounts for the severance payments resulting from employees' termination of employment and comprise the following:

	2019	2018
Insurance endowment fund	$276,566	$270,067
	$276,566	$270,067
Time deposit	$2,098,276	$2,079,222

The fund for severance payments is exposed to a variety of financial risks, including the effects of change in debt and equity market prices, foreign currency exchange rates, and interest rates. The Organization has a policy of considering economic conditions at the time of the contract and consistently monitors the effectiveness of its selection. In 2001, the APO purchased the insurance for employees, of which the beneficiary is the APO. In addition, the Organization has a time deposit in Japanese yen. Time deposit account was classified in cash and cash equivalents as of the statement of financial position date. Net gains on the fund for the insurance endowment fund for the years ended 31 December 2019 and 2018 were $4,081 and $3,869, respectively, and were included in miscellaneous revenues.

12. Liability for severance payments

For the purposes of the actuarial valuations, the Organization used the discount rate of 0.30% per annum for the year ended 31 December 2019 and 0.30% for the year ended 31 December 2018. The expected rate of salary increases was applied in determining the projected benefit obligation and the expected rate was compiled from data of employee's basis salary.

Amounts recognized in profit or loss in respect of the defined benefit plan were as follows:

	2019	2018
Current service cost	$192,892	$249,510
Interest on obligation	6,901	8,370
Net periodic pension cost	$199,793	$257,879

Movements in the present value of the defined benefit obligation in the current period and the amount included in the statements of financial positions arising from the Organization's obligation in respect of its defined benefit plan were as follows:

	2019	2018
Opening defined benefit obligation	$2,333,081	$2,517,221
Current service cost	192,892	249,510
Interest cost	6,901	8,370
Remeasurements (actual gain/loss)	16,158	(148,883)
Benefits paid	(105,163)	(328,959)
Foreign currency translation adjustments	20,367	35,822
Closing defined benefit obligation	$2,464,235	$2,333,081

The impact of the value of the defined benefit obligation of a reasonably possible change to the discount rate of 0.35% per annum for the year ended 31 December 2018, holding all other assumption constant, is presented in the decrease of $6,893.

13. Leases

Note 2 explains the changes and new accounting policy introduced on 1 January 2019, resulting from the adoption of the new accounting standard IFRS 16 Leases.

Reconciliation of lease commitment classified as operating lease on 31 December 2018 is as follows:

Operating lease commitments on 31 December 2018	$214,740
Recognition exemption for short-term leases	-
Recognition exemption for low-valued leases	(19,181)
Lease liabilities recognized on 1 January 2019	$195,560

As a result of applying the modified retrospective method at the date of implementation of IFRS 16 on 1 January 2019, whereby the right-of-use assets were measured at the amount equal to the lease liabilities.

Movements in the right-of use assets for the year ended 31 December 2019 were as follows:

	Office building	Equipment	Total
Right-of-use assets on 1 January 2019	$171,938	$23,622	$195,560
Additions	488,942	-	488,942
Lease contract terminations	(56,149)	-	(56,149)
Right-of-use assets on 31 December 2019	$604,731	$23,622	$628,352
Accumulated depreciation on 1 January 2019	-	-	-
Depreciation	$297,396	$4,973	$302,369
Lease contract terminations	(56,149)	-	(56,149)
Accumulated depreciation on 31 December 2019	$241,248	$4,973	$246,221

Depreciation includes the amount of $241,961 for the exempted office building lease by the landlord from 12 March 2019 to 31 December 2019 due to the fire incident, and the net depreciation expenses paid amount to $60,408, including $11,361 recorded as project costs and $49,047 as administration expenses.

The lease liabilities as of 31 December 2019, by maturity were as follows:

	Lease liabilities
Less than one year	$310,132
Between one and two years	66,692
Between two and three years	5,018
Between three and four years	3,764
Between four and five years	-
After five years	-
Total lease liabilities	$385,606
Less current portion of lease liabilities	310,132
Non-current portion of lease liabilities	$75,473

The following table provides additional disclosures related to right-of-use assets and lease liabilities:

Expense on short-term leases	$444,953
Expense on low-value leases	15,442
Total cash outflows for leases	520,803
Cash outflows for short-term and low-value leases	(460,395)
Payments of lease liabilities	$60,408

The expense on short-term leases in 2019 includes $442,929 of the temporary service offices rent from 20 March 2019 to 31 December 2020.

14. Net adjustment for closed projects

Adjusted revenues and expenses attributed to projects that have already been closed prior to this financial year have been recorded in account of revenues and expenses retroactive year.

	2019	2018
Revenues	$194,557	-
Expenses	(27,783)	$15,434
Net adjustment for closed projects (loss)	$166,774	$15,434

Adjusted revenues were recognized in 2019 for long outstanding Special Cash Grants from the Ministry of Foreign Affairs of Japan for the programs of 2013, 2015, and 2016 and the Ministry of Agriculture, Forestry and Fisheries of Japan for 2009 through 2017, which were refunded to the Treasury of Japan.

15. Unappropriated surplus

The unappropriated surplus of $7,920,085 will be disposed of as follows:

Surplus balance as of 31 December 2019	$7,920,085
To be disposed of in 2020 as follows:	
Funding various 2020 projects	662,972
Surplus balance	$7,257,113

The 61th session of the Governing Body approved $662,972 by using unappropriated surplus to fund the increase for the 2020 budget.

16. Related party transactions

Key management personnel compensations for 2019 and 2018 were as follows:

	2019	2018
Short-term employee benefits	$213,933	$212,365
Annual Leave	12,141	21,670
Severance payment	54,844	-
	$280,918	$234,035

17. Administration expenses

The Organization made a reclassification of staff recruiting expenses from miscellaneous to staff expenses. The reason is to give a true and fair view of the expenses by functions. The impacts of the reclassification for the year ended 31 December 2019 and 31 December 2018 were $127,287 and $56,452, respectively. In order to maintain comparability, the two line-item amounts of administration expenses for 2019 and 2018 were adjusted.

In addition, the operating lease expenses such as the Secretariat office rent at Hongo has been moved from office maintenance to depreciation expenses which amounts to $49,047 for 2019, since IFRS 16 lease was adopted effectively on 1 January 2019. The office maintenance for 2018 doesn't affect.

Both these adjustments don't affect the total administration expenses.

About the APO

The Asian Productivity Organization (APO) is an intergovernmental organization committed to improving productivity in Asia and the Pacific. Established in 1961, the APO contributes to the sustainable socioeconomic development of the region through policy advisory services, institutional capacity-building efforts, sharing of productivity best practices, and dissemination of productivity data and analyses.

The current APO membership comprises 21 economies: Bangladesh; Cambodia; Republic of China; Fiji; Hong Kong; India; Indonesia; Islamic Republic of Iran; Japan; Republic of Korea; Lao PDR; Malaysia; Mongolia; Nepal; Pakistan; Philippines; Singapore; Sri Lanka; Thailand; Turkey; and Vietnam.

The APO Secretariat is located in Tokyo, Japan, headed by a Secretary-General.

Key Activities

Sharing & Dissemination of Productivity Best Practices

The APO promotes best practices in utilizing productivity tools, techniques, and methodologies to enable firms, organizations, and government agencies to boost their productivity sustainably, covering the industry, service, agriculture, and public sectors.

Capability Development

The APO acts as an institution builder, strengthening the ability of national productivity organizations (NPOs) to provide productivity promotion, training, and consultancy services to the public and private sectors. The mechanisms include:

- Technical Expert Services (TES)
- Observational Study Missions (OSMs)
- Bilateral Cooperation Between NPOs (BCBN)
- Demonstration Companies (DMP)
- Centers of Excellence (COE)
- Accreditation of Productivity Certification Bodies

Policy & Advisory Support

The APO serves as a regional adviser, surveys the economic and development policies and performance of each member, and assists in formulating strategies for enhanced productivity and competitiveness through the Specific National Program. Working with national experts, the APO creates productivity master plans for members aligned with their national development plans.

International Cooperation

The APO partners with international organizations, reputable universities, and nonmember governments to build synergy and complementarity, multiplying the impacts and benefits of productivity initiatives for the region.

Emphases

Centrality of Productivity

The APO places productivity at center stage, ensuring that higher productivity receives top priority in national development agendas. This means putting productivity in the driver's seat and recognizing it as the core strength propelling a country's growth.

Innovation-driven Productivity

The APO addressed emerging challenges and opportunities brought about by new-generation technology and the ongoing Industrial Revolution 4.0, capitalizing on innovation as the new driver of productivity.

Inclusive Productivity

The APO encourages all sectors of the community to participate in and contribute to productivity improvement efforts, including those with differing abilities. Inclusivity in productivity ensures that no one is left behind and that the productivity movement is a broad-based effort supported by all.

Linkages with the Sustainable Development Goals (SDGs)

Under the platform of the UN SDGs, the APO assists member countries in meeting their SDG targets, particularly goals 2, 5, 8, 9, 12 and 17. Linkages with the SDGs also enable the APO to collaborate with other international organizations in addressing common global concerns.

APO Directors, Alternate Directors, NPO Heads, and Liaison Officers

(AS OF 30 DEC 2019)

APO Chair
Kobchai Sungsitthisa
APO Director for Thailand

APO First Vice Chair
Tran Van Vinh
APO Director for Vietnam

APO Second Vice Cair
Md. Abdul Halim
APO Director for Bangladesh

BANGLADESH

Director
Md. Abdul Halim
Secretary, Ministry of Industries

Alternate Director & NPO Head
Nishchinta Kumer Podder
Director & Joint Secretary, National Productivity Organisation, Ministry of Industries

Liaison Officer
Md. Nazrul Islam
Joint Director (AC), National Productivity Organisation, Ministry of Industries

CAMBODIA

Director
Phork Sovanrith
Secretary of State, Ministry of Industry and Handicraft

Alternate Director
Chan Saran
Under Secretary of State, Ministry of Industry and Handicraft

NPO Head
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Director, National Productivity Centre of Cambodia, Ministry of Industry and Handicraft

Liaison Officer
Khun Rumyol
Deputy Director, National Productivity Centre of Cambodia, Ministry of Industry and Handicraft

REPUBLIC OF CHINA

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Chairman, China Productivity Center

Alternate Director
Jang-Hwa Leu
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NPO Head
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President, China Productivity Center

Liaison Officer
Hsiu-Lan Lin
Manager, APO Affairs Development China Productivity Center

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Director for National Training and Productivity Centre, Fiji National University

Liaison Officer
Iliana Maiesia
Director Labour Policy and Productivity, Ministry of Employment, Productivity and Industrial Relations

HONG KONG

Director
Not designated

Alternate Director
Not designated

Liaison Officer
Not designated

NPO Head
Not designated

INDIA

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Secretary, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry

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Liaison Officer
K.D. Bhardwaj
Regional Director & Group Head (International Services), National Productivity Council

INDONESIA

Director
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Director General of Training and Productivity, Ministry of Manpower

Alternate Director
Kunjung Masehat
Chairman, National Professional Certification Board

NPO Head & Liaison Officer
Fahrurozi
Director of Productivity Development, Directorate General of Training and Productivity, Ministry of Manpower

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Alternate Director
Not designated

Liaison Officer
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Director, International Affairs Department National Productivity Organization of Islamic Republic of Iran

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Director-General, International Cooperation Bureau, Ministry of Foreign Affairs

Alternate Director
Shige Watanabe
Director, Country Assistance Planning Division I, International Bureau, Ministry of Foreign Affairs

NPO Head
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President, Japan Productivity Center

Liaison Officer
Nao Teranishi
Deputy Director for International Cooperation, Global Management Center, International Cooperation Unit Japan Productivity Center

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Chairman & CEO, Korea Productivity Center

Alternate Director
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Liaison Officer
Taiho Kang
Director, International Cooperation Department, Korea Productivity Center

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Director General, Malaysia Productivity Corporation

Liaison Officer
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Assistant Manager, Corporate & Planning Division, Malaysia Productivity Corporation

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Chairman and Executive Director, Mongolian Productivity Organization

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Executive Director, Human Development, Research and Training Center

Liaison Officer
Batbileg Tsagaan
Deputy Director, Mongolian Productivity Organization

NEPAL

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Secretary, Ministry of Industry, Commerce and Supplies

Alternate Director
Shovakanta Poudel
Joint Secretary, Ministry of Industry, Commerce and Supplies

NPO Head
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General Manager, National Productivity and Economic Development Centre

Liaison Officer
Kalyan Ghimire
Research Officer/Consultant, National Productivity and Economic Development Centre

PAKISTAN

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Alternate Director
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Additional Secretary I, Ministry of Industries and Production

NPO Head
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Chief Executive Officer, National Productivity Organization

Liaison Officer
Muhammad Zafar Ullah
Head of IT, National Productivity Organization

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Undersecretary for Regional Development Office, National Economic and Development Authority

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President & Chief Executive Officer, Development Academy of the Philippines

Liaison Officer
Armand Tristan R. Suratos
Project Officer

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Assistant Chief Executive Officer, ICM & Digitalisation, Enterprise Services & New Industries, Enterprise Singapore

Alternate Director
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Executive Director, Enterprise Academy, Enterprise Singapore

NPO Head
Michael Tan
Chief Executive Officer, Singapore Productivity Centre

Liaison Officer
William Lim Jing Han
Assistant Director (International Relations and Strategic Partnerships), Singapore Productivity Centre

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Secretary, Ministry of Skills Development, Employment and Labour Relations

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Additional Secretary, Ministry of Skills Development, Employment and Labour Relations

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Director, National Productivity Secretariat, Ministry of Skills Development, Employment and Labour Relations

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Additional Director, National Productivity Secretariat, Ministry of Skills Development, Employment and Labour Relations

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Permanent Secretary, Ministry of Industry

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Ratchada Asisonthisakul
International Relations Department Manager, Thailand Productivity Institute

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Director General, Directorate for Standards, Metrology and Quality

Alternate Director
Dr. Ha Minh Hiep
Deputy Director General, Directorate for Standards, Metrology and Quality

NPO Head
Nguyen Anh Tuan
Director, Vietnam National Productivity Institute

Liaison Officer
Phan Thanh Son
Officer, International Cooperation Department, Directorate for Standards, Metrology and Quality

Appendices

APO 2019

Projects At A Glance

176
projects

7,410
participants attended APO projects

539
experts assigned to APO projects

6,729
observers to APO events open to the public

APPENDIX 1

List of 2019 Projects

In 2019, the number of projects the APO conducted totaled 176 (106 projects had been completed and 70 were in progress as of 31 December 2019), with 7,410 participants. A total of 539 experts facilitated these projects. The APO also extended its outreach to 6,729 observers through projects/events open to the public.

APO Projects in 2019

TYPE OF PROJECTS	PROJECT		RESOURCE PERSONS		PARTICIPANTS
	Completed	In progress	Completed	In progress	
Multicountry projects	47	52	265	148	6,121
Individual-country projects	59	18	97	29	1,289
Subtotal	106	70	362	177	
Total	**176**		**539**		**7,410**

SMART TRANSFORMATION

Industry Transformation

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Workshop on the Internet of Things for Productivity Enhancement	ROC	18
Training of Trainers on Assistance Systems for Cyberphysical Facilities	ROC	18
Workshop on Developing a Roadmap for Industry 4.0	ROC	17
Workshop and Practitioners' Group Meeting on Standardization of Industrial Automation	India	15
Training of Trainers in Material Flow Cost for Accounting for SMEs	Pakistan	17
Training Program on Productivity Improvement for the Supporting Industry	APO Secretariat	1429
Research on Capacity Development Needs for Industry 4.0	APO Secretariat	13
Research on National Strategy on Developing Human Resources for the Industries of the Future	APO Secretariat	16

Public Sector

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Workshop on Accountable Governance for Productivity Growth and Competitiveness	Bangladesh	20
Workshop on Advanced Performance Management for Modern Public-sector Organizations	Bangladesh	21

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Workshop on Measuring, Monitoring, and Evaluating Regulatory Performance for Productivity and Competitiveness	Malaysia	22
Training of Trainers on Productivity Measurement for Public-sector Organizations	Philippines	22
Workshop on Developing a Regulatory Management System (RMS) Framework to Improve Public-sector Productivity	Philippines	17
Workshop on Delivering Citizen-centered Public Service and Driving Innovation	Philippines	21
International Conference on Public-sector Productivity	Philippines	162
Training of Trainers on Big Data Analytics for Public-sector Productivity	Thailand	24
Research on Measurement of Productivity in the Public Sector	APO Secretariat	14
Research on Change Management in the Public Sector	APO Secretariat	11
Research on Youth Employment Issues and Human Capital Development for APO Economies	APO Secretariat	10
Research on Science, Technology, and Innovation Policies in Member Countries and Implications for Productivity Enhancement	APO Secretariat	18
Research on Public Policy Innovation for Human Capital Development	APO Secretariat	11
Research on Digitization of Public Service Delivery	APO Secretariat	10
Research on Education for Future Industry	APO Secretariat	13

Smart Services

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Training of Trainers on Smart Service and Technology for the Health Sector	Indonesia	24
Workshop on Developing Standards for Smart Cities	ROK	19
APO Development Workshop for Practitioners of Business Excellence	Singapore	15
Workshop on the Use of Smart Technology to Raise Productivity in the Service Sector	Singapore	17
Research on Case Studies of Diversity Management and Human Capital Strategy	APO Secretariat	11

Agriculture Transformation

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
International Conference on Smart Agriculture and Food Safety Management	ROC	285
National Conference on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality	India	150
National Workshop on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality	Mongolia	110
Workshop on Building Climate Resilience in Agriculture	Bangladesh	20
National Conference on Developing Sustainable and Competitive Agribusiness in Cambodia	Cambodia	70
Organic Agroindustry Development Leadership Course in Asia	Cambodia	23
Workshop on Innovations in Agribusiness for Young Entrepreneurs	ROC	29
4th International Conference on Biofertilizers and Biopesticides: Integrated Pest Management	ROC	148
Workshop on Rural Community Development for Sustainable and Inclusive Growth	Fiji	22
Workshop on Accelerating Agribusiness Startups	Indonesia	23
Workshop on Agricultural Transformation	Indonesia	22

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Multicountry Observational Study Mission on Sustainable Food Value Chains	Japan	16
Multicountry Observational Study Mission on Good Agricultural Practices (GAP) and Advanced Postharvest Handling Technologies	Japan	18
National Conference-cum-Workshop on Enhancing Good Agricultural Practices Implementation in the Mongolian Agriculture Sector	Mongolia	80
Workshop on Value-added Agriculture	Pakistan	22
Workshop on the Formulation and Study of Spatial Development, Climate Change, and the Environment for Agricultural Transformation	Philippines	20
Asian Food and Agribusiness Conference: Smart Food Value Chains	Thailand	43
Workshop on Smart Farming Models	Thailand	20
Workshop on Trends in the Development of Traditional Craft Villages in the Industry 4.0 Era	Vietnam	23
Workshop on Application of Smart Organic Agriculture Models and Traceability Systems for Agriculture Products	Vietnam	23
Research on Successful Agribusiness Models: Case Studies of Value Chain Analysis for Agroprocessing Enterprises	APO Secretariat	1
Research on Smart Agricultural Transformation for APO Member Countries	APO Secretariat	10

Future Food

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Workshop on Food Safety Regulations and Related Issues	Lao PDR	20

CAPABILITY DEVELOPMENT

Strategic Foresight

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS/ INSTITUTION
Conference on the Future of Work	ROC	34
Forum on Disruptive Technologies and Technology-driven Productivity	Indonesia	70
Training of Trainers in Foresight Management and Scenario Development for Development Planners	Malaysia	24
Research on Construction of a Productivity Forecasting Model Framework	APO Secretariat	1

Sustainable Productivity

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS/ INSTITUTION
Workshop on Sustainable Productivity	Japan	18
Development of Long-term Productivity Measures	APO Secretariat	4
Developing Improved Statistics and Methods for Sustainable Productivity	APO Secretariat	1
APO Productivity Databook and Database (2019 edition)	APO Secretariat	21
APO Productivity Databook and Database (2020 edition)	APO Secretariat	1
Research on Reskilling Workers to Enhance Labor Productivity	APO Secretariat	11

Centers of Excellence

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
COE on Smart Manufacturing: Expert Panel Meeting to Assess the Proposal for a COE on Smart Manufacturing	MCs	4
COE on Smart Manufacturing: Deputation of Experts to APO Member Countries	Vietnam	1
COE on Smart Manufacturing: International Forum on Smart Manufacturing and Launching Ceremony	ROC	122
COE on Smart Manufacturing: Assessment of Smart Manufacturing and Needs of Member Countries	ROC	7
COE on GP: Industrial Collaboration Summit on Green Technology	ROC	150
COE on GP: International Conference on Green Consumption	ROC	170
COE on GP: International E-waste Management Network Workshop	Thailand	30
COE on GP: Review of Emerging and Priority Needs on Green Productivity	APO Secretariat	2
Research on GP for the Base of the Pyramid for Sustainable Development in APO Member Countries	APO Secretariat	9
COE on Industry 4.0: Development of the Expert Database on IT for Industry 4.0	India	1
COE on Industry 4.0: Development of Demonstration Companies on IT for Industry 4.0	India	1
COE on Industry 4.0: Research Mission on IT for Industry 4.0	APO Secretariat	6
COE on Industry 4.0: Research on Industry 4.0 Digitization Strategies for SMEs	APO Secretariat	6
COE on Industry 4.0: Evaluation of the Performance of the APO Centers of Excellence (COE)	APO Secretariat	1
COE on Industry 4.0: Development of the Toolkit for SMEs on Industry 4.0 Transformation	APO Secretariat	1
COE on Business Excellence: Strengthening the Programs of the Center of Excellence on Business Excellence	Singapore	2
COE on Business Excellence: Review of Priority Needs on Business Excellence	APO Secretariat	1
Development of Monitoring and Evaluation Systems for the APO Centers of Excellence	APO Secretariat	1

Program Development Fund

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Task Force for a New APO Vision and Strategy 2025	Japan	12
Research on Knowledge Management with the Concept of Sustainable Productivity	APO Secretariat	2
Accreditation and Certification Process: Authentication of APO Certificates Using Blockchain Technology	APO Secretariat	N/A(*)

(*) Vendor

Accreditation Body

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Training of Trainers and Consultants in Green Productivity	ROC	21
Workshop on Advanced Strategic Management for Enhancing Productivity	Fiji	24
Certified Productivity Practitioners' Course for NPOs	Philippines	17
Development of Public-sector Productivity Specialists (APO Certified Public-sector Productivity Specialists)	Thailand	20

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Training of Trainers and Consultants in Green Productivity	ROC	21
Workshop on Advanced Strategic Management for Enhancing Productivity	Fiji	24
Certified Productivity Practitioners' Course for NPOs	Philippines	17
Development of Public-sector Productivity Specialists (APO Certified Public-sector Productivity Specialists)	Thailand	20
APO Productivity Practitioners Certification Management System	APO Secretariat	3
APO Accreditation and Certification Development Program	APO Secretariat	42
Technical Working Group on the Development of Green Productivity Certification Scheme	Indonesia	7
Technical Working Group on the Development of Accreditation Standard Operating Procedures	Malaysia	7
Technical Working Group on the Development of Productivity Specialist Certification Scheme	Malaysia	7
Technical Working Group on the Development of Public-sector Specialists Certification Scheme	Philippines	6
Technical Working Group on the Development of the Future-readiness Award Program	Thailand	6
APO Accreditation and Certification Development Program: APO-AB Council Meeting	APO Secretariat	15
Certification Body Development Program: Development Project for the Directorate of Productivity Development (NPO of Indonesia) as an APO Certification Body	Indonesia	5
Development of the Strategic Foresight Certification Scheme	APO Secretariat	7

Digital Learning

PROJECT	PARTICIPANTS
Self-learning e-Course on Modern Food Storage and Transport Technologies	102
Self-learning e-Course on Organic Inspection and Certification	109
Self-learning e-Course on Innovative Cost-effective Technologies for Sustainable Agriculture	67
Self-learning e-Course on Modern Food Distribution Systems	30
Self-learning e-Course on Innovations in Agroforestry Systems	6
Self-learning e-Course on Waste Management in Agribusiness	88
Self-learning e-Course on Controlled-environment Agriculture	89
Self-learning e-Course on Good Agricultural Practices (GAP)	100
Self-learning e-Course on Agritourism Business Development	82
Self-learning e-Course on Food Safety Management (Basic)	157
Self-learning e-Course on Organic Agriculture and Organic Agribusiness	151
Self-learning e-Course on Agribusiness Management (Advanced)	78
Self-learning e-Course on Food Safety Management (Advanced)	129
Self-learning e-Course on Rural Entrepreneurship Development	154
Self-learning e-Course on Urban Agriculture	129
Self-learning e-Course on Building Climate Change-resilient Agriculture	151
Self-learning e-Course on Future Food: Exploring Business Opportunities	141
Self-learning e-Course on Business Models for Women Entrepreneurs	122
Self-learning e-Course on Smart Farm Mechanization	148
Self-learning e-Course on Basic Data Analytics for the Public Sector	421

PROJECT	PARTICIPANTS/ VISITORS
Self-learning e-Course on Management Innovation in SMEs	2
Self-learning e-Course on Critical Strategic Foresight Tools for Sustainable Productivity	5
Self-learning e-Course on Basic Smart Manufacturing 101 in a Blockchain-driven Era	6
Self-learning e-Course on Marketing Strategy and Product Branding for SMEs	118
Self-learning e-Course on the Occupational Health and Safety Management System (OHSAS 18001)	218
Self-learning e-Course on Productivity Tools and Techniques (Basic)	349
Self-learning e-Course on Productivity Tools and Techniques (Advanced)	192
Self-learning e-Course on Applying Green Productivity Based on ISO 14001 Standards	123
Self-learning e-Course on Material Flow Cost Accounting (ISO 14051)	137
Self-learning e-Course on Climate Change Impacts and Adaptation (Basic)	113
Self-learning e-Course on Smart Manufacturing: Basic	211
Self-learning e-Course on Smart Manufacturing: Advanced	70
Self-learning e-Course on the Energy Management System Auditors' Course	186
Self-learning e-Course on Sustainable, Resilient Supply Chains	125
Self-learning e-Course on Integrating Lean Manufacturing Systems and Industry 4.0 Concepts	242
Self-learning e-Course on Green Productivity and Integrated Management Systems	167
Self-learning e-Course on Energy Efficiency Techniques	214

INDIVIDUAL PROGRAM

Specific National Program

PROJECT	VENUE	PARTICIPANTS/ RESOURCE PERSONS
Institutional Capability Development Plan for the National Productivity Organisation of Bangladesh	Bangladesh	1
Policy Consultancy on Innovation-driven Productivity Improvement	Bangladesh	4
Policy Consultancy on Innovation-driven Productivity Improvement	Fiji	3
Development of the National Productivity Master Plan for Lao PDR	Lao PDR	3
Institutional Capability Development Plan for the Mongolian Productivity Organization	Mongolia	1
Training of Trainers on Strategic Foresight and Scenario Planning	Philippines	26
Development of the National Productivity Master Plan for Vietnam	Vietnam	1

Individual-country Observational Study Missions

SUBJECT	DEPUTING COUNTRY	VENUE	PARTICIPANTS
SME Development through Innovation and Smart Technology for Entrepreneurs and Startup Businesses	Cambodia	ROC	10
New Technologies and Ways of Thinking	Singapore	India	8
Energy Efficiency	Mongolia	Japan	6
Benchmarking against the Productivity Movement in the ROK	Malaysia	ROK	9
Productivity Measurement in MSMEs	Philippines	Malaysia	17
Registered Management Consultants (RMCs)	Malaysia	Singapore	5

Bilateral Cooperation Between NPOs

SUBJECT	DEPUTING COUNTRY	VENUE	PARTICIPANTS
Productivity Improvement and SME Development in Fiji through Manufacturing Excellence	Cambodia	Fiji	4
Benchmarking on Smart Manufacturing and the Internationalization of Korean Food	ROC	ROK	5
Strategic Planning for Productivity Enhancement through Innovation, Industry 4.0, and Agricultural Transformation in Mongolia	ROC	Mongolia	4
Knowledge Sharing and Discussion on Best Practices on Smart Manufacturing in the ROC and ROK	India	ROC, ROK	2
Best Practices and Experiences in Productivity Improvement in the Era of Industry 4.0	Vietnam	ROC, ROK	4
Productivity Promotion, Innovation, and Industry 4.0	Fiji	ROK, Sri Lanka	4

Demonstration Companies

SUBJECT	VENUE
Material Flow Cost Accounting in Sugar Production	Bangladesh
Material Flow Cost Accounting for the Leather Sector	Bangladesh
Innovation, Quality Circles, and Lean Manufacturing for Productivity Enhancement in SMEs	Cambodia
Transforming Chicken Litter into Value-added Commecial Product(s) in Future Farms Limited	Fiji
Application of Smart Technologies	India
MFCA-linked Lean Manufacturing for SMEs in the Manufacturing Sector	India
Off-grid Solar PV Training Project	Indonesia
Training of Applications of Mini-grid Solar PV Systems	Indonesia
Material Flow Cost Accounting	Pakistan
Applications of Green Productivity Tools and Techniques in the Printing Industry	Sri Lanka
Industry 4.0 Applications for the Healthcare Sector	Thailand
Scientific Molding: Digitization for Productivity Improvement in Manufacturing	Thailand
Implementation of GLOBALGAP in Sun Feed Joint Stock Company	Vietnam

Technical Expert Services

SUBJECT	VENUE
Lean Manufacturing Systems and Applications	Bangladesh
Knowledge Management	Bangladesh
Improvement of Productivity through Maintaining Proper Labor–Management Cooperation	Bangladesh
Training of Trainers on Innovation and Quality Circles	Cambodia
Training of Trainers on Essential Consultancy Skills Incorporating ISO 20700 (ECS I)	Cambodia
2019 Regional Agriculture Land Seminar	ROC
Animal Product Brand and Marketing Forum	ROC
Training of Trainers on Information System Security	Fiji
Certified Managers of Quality and Organizational Excellence	Fiji
Circular Economy Symposium 2019	India
Enhancement of Competencies of Productivity Instructors to Analyze the Level of Productivity of Companies	Indonesia
National Quality and Productivity Convention XXII 2019	Indonesia

SUBJECT	VENUE
Innovation Seminar in Tokyo: 64th Karuizawa Top Management Seminar—A New Business Form through Open Innovation	Japan
Public Service Productivity Workshop on the Health Sector	Malaysia
Training of Trainers on Organic Agribusiness Value Chains	Mongolia
Business Excellence for Public-sector Productivity Improvement	Mongolia
Training of Trainers on Integrated Pest Management	Mongolia
2019 Public-sector HR Symposium and Assistance to NPOs	Philippines
Establishing a Capacity Building Program for Institutionalizing Service Quality Standards towards an Innovative Citizen-Centered Public Service Delivery	Philippines
Training Course on Traffic Light Score Methodology for ex post Regulatory Impact Assessment	Philippines
Industry 4.0 and Smart Technologies for MSMEs	Philippines
Development of Consultants' Competency for Industry 4.0 Transformation in Manufacturing and Service	Thailand
Applying the DMADV Methodology to Improve Capability in Product Design and Development Processes	Vietnam
Updating Training within Industry for Vietnamese Consultants	Vietnam
Researching and Developing the Result-based Monitoring and Evaluation System for APO Project Implementation	Vietnam
Training Vietnam National Quality Award Assessors/Trainers in the Baldrige Award Criteria for Performance Excellence	Vietnam

PROJECTS FUNDED BY SPECIAL CASH GRANTS

PROJECT	VENUE
Policy Consultancy on Innovation-driven Productivity Improvement	Bangladesh
International Conference on Smart Agriculture and Food Safety Management	ROC
Policy Consultancy on Innovation-driven Productivity Improvement	Fiji
National Conference on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality	India
Multicountry Observational Study Mission on Sustainable Food Value Chains	Japan
National Workshop on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality	Mongolia

INTERNATIONAL COOPERATION

Services of Experts Received

PROJECT	COLLABORATING ORGANIZATION
Workshop on Building Climate Resilience in Agriculture	International Center for Tropical Agriculture (CIAT)
Workshop on Developing Regulatory Management System (RMS) Framework to Improve Public-sector Productivity	Organisation for Economic Co-operation and Development (OECD)

Guest Observers Received

PROJECT	ORGANIZATION/NUMBER OF OBSERVERS
61st Session of the APO Governing Body	United Nations Industrial Development Organization (UNIDO)/1
60th Workshop Meeting of Heads of NPOs	Pan African Productivity Association (PAPA)/1

APPENDIX 2

Summaries of 2019 Projects

Smart Transformation

INDUSTRY TRANSFORMATION

Workshop on The Internet of Things for Productivity Enhancement

The Internet of Things (IoT) involves the digitization of physical objects, connecting them to a network. This enables real-time data generation, collection, and analytics for the public and private sectors. The emerging technologies hold a great deal of promise for improving the productivity and competitiveness of member economies if leveraged correctly. There are already several use cases and IoT solution concepts in the areas of manufacturing, energy management, transport, and agriculture across the Asia-Pacific and beyond.

To enhance participants' understanding of the IoT for enhancing productivity and competitiveness, the APO in cooperation with the CPC organized a workshop on The Internet of Things for Productivity Enhancement, 27–31 May, in Taipei. Eighteen participants from 11 member economies and three international resource persons attended.

Program coverage: Introduction to the IoT; Opportunities and challenges of the IoT; Improving productivity through leveraging the IoT; Exploring applications of the IoT across sectors and countries; Smart cities, farms, and offices; Role of different actors in adopting, advancing, and managing the IoT; Required infrastructure and capabilities for leveraging the IoT; and Policies, strategies, and programs for leveraging the IoT. Participants visited the Advantech Co. Ltd. headquarters, a provider of IoT and smart city solutions; and the Industrial Training and Research Institute, which is promoting the ROC's shift to a innovation-centric economy through science and technology research.

Training of Trainers on Assistance Systems for Cyberphysical Facilities

A cyberphysical system (CPS), as a mechanism comprising interacting digital, analogue, physical, and human components, controlled by algorithms, and integrated with the Internet and its users, signifies the core concept of smart manufacturing by linking physical systems with digital information flows and serves as the first step in moving toward advanced manufacturing. Understanding the concepts and applications of CPS and basic assistance systems with similar features thus becomes indispensable to prepare manufacturers for upgrading in the age of Industry 4.0.

To examine how specific technologies support the initiation of manufacturing digitization with a focus on assistance systems that incorporate digital, analogue, physical, and human components, the APO collaborated with the CPC to organize a training-of-trainers course on Cyberphysical Systems and Fundamental Technologies for Digital Upgrading in Taipei, 5–9 August. Eighteen participants from 10 APO members attended the course, and resource persons from the ROC, EU, and Singapore gave a comprehensive overview of Industry 4.0 trends and policy programs in addition to hands-on training in applications of IoT devices, robotics, and data analytics.

Program coverage: Introduction to Industry 4.0 and trends; Digitizing industries: Policy support in the EU; Strategies and practices from the EU for artificial intelligence (AI) development and deployment in Industries; the APO Center of Excellence on Smart Manufacturing (COE on SM); Supply chain transformation: Applications of the IoT and CPS; The IoT and hands-on assembly exercise; Autonomous technologies and robotics; Robotic process automation; Analytics, algorithms, and AI; and The innovation and transformation toolkit. Participants attended the International Forum of the APO COE on SM and visited the Smart Manufacturing Pilot Production Site of the Industrial Technology Research Institute.

Workshop on Developing a Roadmap for Industry 4.0

Industry 4.0 is considered to be a new paradigm not only for the breadth and depth of the changes it makes to the systems of production, management, innovation, and government but also for its implications for economic systems, social relations, human capital, and other aspects such as equality, trust, values, and ethics. Although today it is generally regarded as a mix of the trends, strategies, movements, practices, and technologies related to digitization, smart manufacturing, and the fusion of advanced technologies, the complexity of Industry 4.0 demands an even broader view, engaging different sectors and stakeholders, as well as a dynamic understanding of technological advances and socioeconomic trends.

To provide a reference for its members to construct step-by-step strategies for industrial upgrading and reinforce their development policies, the APO organized a workshop on Developing a Roadmap for Industry 4.0 in Taipei, 19–23 August, in collaboration with the CPC. The workshop was attended by 17 participants from 13 APO members, where resource persons from the ROC, Germany, Malaysia, and Singapore shared their insights on mega trends in technological progress and economic development, specific strategies and policy programs in Asian and European countries, stakeholders in the ecosystems for Industry 4.0, implications of the Industry 4.0 movement, and practical tools and methodologies for digital upgrading.

Program coverage: Introduction to Industry 4.0; Opportunities and challenges to Asia; The Smart Industry Readiness Index; Ecosystem and strategies for industrial upgrading; Regionalism, Industry 4.0, and impact on ASEAN; Bridging the gap between Industry 4.0 awareness and implementation; Industry 4.0 initiatives in Taiwan; and The APO COE on SM. Participants toured the facilities of the APO COE on SM and the Smart Manufacturing Pilot Production Site of the Industrial Technology Research Institute, where they were able to ask questions on industrial upgrading strategies undertaken.

Workshop and Practitioners' Group Meeting on Standardization of Industrial Automation

The Industry 4.0 movement is characterized by adopting advanced technologies to achieve continuous optimization of manufacturing processes and create innovative business models. Such optimization relies on seamless, Internet-supported integration of systems, which depends in turn on compliance with commonly recognized standards and reference frameworks that facilitate compatibility among machines, interoperability in applications, and communication among systems. Standardization is thus crucial for the success of Industry 4.0 and has significant implications for all stakeholders in global value chains.

To develop an understanding of current standardization work for smart manufacturing and support international coordination of industrial standards, the APO along with the NPC, India, organized a multicountry workshop on Standardization of Industrial Automation in New Delhi, 14–15 March. Fifteen participants and 10 observers from six APO members attended the workshop, along with resource persons from Austria, Germany, India, Japan, and the USA, who shared current developments and initiatives in standardization work in major industrial countries and international bodies.

Program coverage: Industry 4.0, the Industrial Internet of Things (IIOT), and standardization; Building the IIoT ecosystem; Internet of Production as a framework for Industry 4.0; Standardization and connected industries in Japan; Overview of the AI ecosystem standardization work in

the ISO and IEC; Approaches for standardization of Industrie 4.0 in Germany; Harmonizing smart manufacturing; Challenges in the IIOT and smart manufacturing for Asian countries; The Smart Industry Readiness Index of Singapore; Standard mapping for Industry 4.0; International cooperation in standardization; How can emerging countries benefit from and leverage Industry 4.0?; and Roadmap for standardization for emerging countries.

Training of Trainers in Material Flow Cost Accounting for SMEs

The APO, in collaboration with the NPO of Pakistan, conducted a training-of-trainers course on Material Flow Cost Accounting (MFCA) for SMEs in Islamabad, 2–6 September. Twenty-one international and local participants from six APO member countries attended this hands-on course. MFCA is a relatively new concept in Pakistan and is used by manufacturers in advanced countries such as Germany, Japan, and the ROK to improve material and energy efficiencies while simultaneously supporting environmental management and ecologically sustainable production.

This course provided a platform for company executives and environmental management professionals, including public-sector MFCA practitioners, to exchange real-life experiences, best practices, and information on waste management and MFCA applications. It was held in conjunction with the APO–NPO International Conference on MFCA: Development of Demonstration Companies attended by Federal Minister and Advisor to the Prime Minister for Climate Change Malik Amin Aslam as well as Minister of State for Parliamentary Affairs Ali Muhammad Khan. This training-of-trainers course focused on SMEs, since they are widely regarded as a vulnerable sector that could benefit the most from MFCA.

Program coverage: MFCA concepts, tools, and methodologies; Materials and energy efficiency; SME productivity tools; Green Productivity promotion and applications; and The circular economy.

Training Program on Productivity Improvement for the Supporting Industry

Through cooperation with local enterprises, numerous Japanese companies have expanded their businesses into other countries in Asia and contributed to their economic growth. To maintain rapid economic growth, improved productivity in local supporting industries is particularly crucial. The Training Program on Productivity Improvement for the Supporting Industry, conducted under a special cash grant from the Japanese Ministry of Economy, Trade and Industry, aims to promote improvements in local supporting industries and the quality of their human resources by providing opportunities to learn about and acquire productivity skills and management techniques developed and refined in Japan. This will allow more supporting industries to contribute to higher national productivity. The program is designed to benefit local companies that are current or potential suppliers and business partners of Japanese companies in the target countries as well as Japanese SMEs that have business bases in those countries.

In 2019, 97 proposals were received from 42 local companies in India wishing to apply for training courses under the scheme proposed by Japanese manufacturers, and 1,233 Indian workers were trained.

Program coverage: Productivity skills and management techniques; and Smart industry technology, such as the IoT, the cloud, and additive manufacturing.

Research on Capacity Development Needs for Industry 4.0

Industry 4.0, driven by new-generation technologies, is transforming the future of production systems. The response to the waves of Industry 4.0 must be strategically integrated with national policies on industrial competitiveness, labor markets, and new digital ecosystems. A major challenge in coping with Industry 4.0 is the need for human capital, specifically people with the qualifications to plan, oversee, and operate digital processes and services.

The research on Capacity Development Needs for Industry 4.0 initiated by the APO is examining the level of Industry 4.0 integration into national industrial policies. The status of readiness of businesses in the region to adopt Industry 4.0 in selected APO member countries is also covered. Specifically, the research is looking into the contexts of the economy, labor markets, education, digital infrastructure, policies, and national innovation capabilities. A chief expert from Germany and six national experts from the ROC, India, Indonesia, Malaysia, the Philippines, and Vietnam were assigned to conduct the research. Critical needs for capacity development for embracing Industry 4.0 at national level, thus unlocking opportunities for exponential growth through leveraging digital technologies, was pinpointed in the report completed in December 2019.

Program coverage: The APO COE on IT for Industry 4.0; Industry 4.0 context conditions; Wealth of data; Industrial digital ecosystems; Innovative productive systems; Innovation capability; Human capital; and Complexity capital, structural capital, and relational capital.

Research on National Strategy on Developing Human Resources for the Industries of the Future

The rapid spread of new-generation technologies has transformed the future of production systems and led to the creation of the new industries of the future. Individuals need to acquire the necessary skills and to equip themselves with knowledge and abilities to be relevant to tomorrow's labor market. Responses to the waves of Industry 4.0 must also be incorporated in national policies on industry competitiveness, employment, and new industrial digital ecosystems.

In 2019, the APO initiated a research project on National Strategy on Developing Human Resources for the Industries of the Future. The research aims to support member countries in studying the strategic approaches to national human capital development policies to enhance the qualifications of labor for the industries of the future, thus ensuring sustainable national productivity growth. It also examines the requirements for enhanced skills, different organizational structures, and new elements of education as critical factors at national level for the workforce to be relevant in the future. One chief expert and seven national experts from the ROC, India, Indonesia, Malaysia, Pakistan, the Philippines, and Vietnam were assigned to conduct the research. A coordination meeting of experts was organized 12–14 November in Tokyo. The experts presented the preliminary findings and agreed on the research methodology during the meeting. The final report will provide member countries with policy implications for national strategies on human capital development for the industries of the future.

Program coverage: Human resources development; Industries of the future; National human resources strategies and policies; Education policy; Future labor markets; Reskilling, upskilling, and industry competitiveness; Qualifications of labor; and National productivity growth.

PUBLIC SECTOR

Workshop on Accountable Governance for Productivity Growth and Competitiveness

In recent years, different frameworks have been developed to organize the complex competitiveness drivers and distinguish among macroeconomic factors such as the quality of institutions and overall economic policies that set the broader context in which firms operate; the microeconomic factors like the business environment quality, clusters, firm sophistication, etc. that have a more direct impact on firm productivity; and the endowments that affect how the macro- and microeconomic factors can be shaped by policies and good governance mechanisms. Addressing these various issues through the Public-sector Program under its Transformation Initiative, the APO focuses on areas relevant to the challenges faced by governments, especially in enhancing governance effectiveness by undertaking competitiveness- and productivity-enhancing strategies.

The APO organized a workshop on Accountable Governance for Productivity Growth and Competitiveness, 21–25 April, in Dhaka, Bangladesh, which was hosted by the NPO under the Ministry of Industries. It was attended by 20 participants from 11 member countries. The objectives were to: review the importance and implications of accountable governance for the productivity growth and competitiveness of member countries; explore key issues, quality policy formulation, and implementation in strengthening accountable governance; and assess governance capacities and government performance including their impact on productivity growth and competitiveness to make the public sector future-ready. Three resource persons from the ROK, Malaysia, and the Philippines as well as one local speaker made presentations on various topics relating to accountable governance and its implications for competitiveness and productivity.

Program coverage: Defining accountable governance; Linking accountable governance with productivity and competitiveness; The Global Competitiveness Framework; Assessing competitiveness and productivity; Implications of digital technology for governance, productivity, and competitiveness; and The future of accountable governance, competitiveness, and national productivity. The participants visited a public-sector organization to apply and enhance their learning and presented action plans to create multiplier effects, especially in reviewing their own governance systems.

Workshop on Advanced Performance Management for Modern Public-sector Organizations

Performance management systems are the systems in an organization by which its performance is measured, controlled, and improved to achieve its strategic goals. The overall aim is to establish a high-performance culture in which individuals and teams take responsibility for the continuous improvement of business processes and of their own skills and contributions within a framework provided by effective leadership. Aligned with the Transformation Program of the APO, new areas and knowledge that contribute to governance effectiveness through the adoption of advanced performance management systems in public-sector organizations in the region are being explored.

The APO organized a workshop on Advanced Performance Management for Modern Public-sector Organizations, 19–23 May, in Dhaka, Bangladesh, which was hosted by the NPO under the Ministry of Industries. The objectives were to: review and assess existing performance management of governments in member countries; formulate strategic plans for promoting advanced performance management in public-sector organizations; and achieve the target of improved governance effectiveness and future-readiness of public-sector agencies in the region. Three resource persons from Belgium, the ROK, and Malaysia as well as one local speaker made presentations on various topics relating to advanced performance management for public-sector organizations. The workshop was attended by 21 individuals from 11 member countries.

Program coverage: Definition and evolution of performance management systems; Digital technology and advanced performance management; Linking advanced performance management and productivity in public service; Strategy development and development analytics in the public sector; and Advanced performance management of the public sector in the future. The participants visited the Bangladesh Public Administration Training Center, a public-sector organization, to apply and enhance their learning and presented action plans to create multiplier effects in reviewing the performance management systems in their own organizations.

Workshop on Measuring, Monitoring, and Evaluating Regulatory Performance for Productivity and Competitiveness

Many governments have progressed in the development of regulatory policies emphasizing deregulation, privatization, re-regulation, and the creation of independent regulatory agencies. However, they need to evaluate regulatory effectiveness to ensure evidence-based decision

making and accountability within the public service. The widespread adoption of Good Regulatory Practices (GRP) in the policymaking process greatly enhances accountability, transparency, and inclusiveness and builds trust in the public sector. Through GRP, stakeholders have the opportunity to contribute to policy and regulatory decisions that affect them and the economy. The APO is therefore supporting member governments by providing systematic guidance on how to improve existing regulatory effectiveness through capacity-building initiatives.

The APO organized a workshop on Measuring, Monitoring, and Evaluating Regulatory Performance for Productivity and Competitiveness, 7–11 October in Kuala Lumpur, which was hosted by the MPC. The objectives were to: identify suitable practices in measuring, monitoring, and evaluating regulatory performance to enhance national productivity and competitiveness; review the effectiveness and quality of regulatory policies/programs for better design and implementation; and provide an understanding of effective measurement, monitoring, and evaluation systems for regulatory activities undertaken by governments. Three resource persons from Canada, the ROK, and the Philippines as well as three local speakers made presentations on various topics relating to regulatory performance. The workshop was attended by 22 individuals from 15 member countries.

Program coverage: Linking regulatory performance with productivity and competitiveness; Framework of GRP; Creating a strong foundation for regulation through effective roles of a central oversight body; Effective rule-making processes through public consultation; Evaluating regulations through regulatory impact assessment; Strategic approaches and tools in measuring, monitoring, and evaluating regulations; and Understanding the indicators of regulatory performance. The participants also visited Kuala Lumpur City Hall to examine the measurement, monitoring, and evaluation methods it uses to determine the effectiveness of existing regulations.

Training of Trainers on Productivity Measurement for Public-sector Organizations

Public-sector productivity is an important part of the economic performance of a country. Yet measuring productivity in the sector, especially of public services, is not a simple task. It requires an appropriate framework and robust calculations of various basic inputs. As the government's function is not to maximize profits but people's welfare, performance measures in the public sector must therefore be addressed differently. Under the APO Public-sector Program, productivity measurement is considered a major activity, not only to learn about the concepts and approaches but also to equip participants to become trainers which is part of the capacity-building element of the program.

The APO organized a Training of Trainers on Productivity Measurement for Public-sector Organizations, 24–28 June, in Manila, the Philippines, which was hosted by the DAP. The objectives were to: familiarize participants with the concepts of and approaches to measuring public-sector productivity, including key indicators for different public services; agree on the appropriate measurements and methods to calculate the productivity of public-sector organizations; and create a pool of trainers on productivity measurement for the public sector in member countries. Three resource persons from Australia, France, and Malaysia as well as two local speakers made presentations on various topics relating to public-sector productivity measurement. The workshop was attended by 22 individuals from 12 member countries.

Program coverage: Introduction to productivity and quality concepts applicable to the public sector; Measurement and analysis of public-sector productivity; Qualitative and quantitative approaches to analyzing public-sector productivity; Challenges in public-sector productivity measurement; and Human resources and technology in enhancing public-sector productivity. The participants visited the Philippine Heart Center, a public-sector organization, to apply and enhance their learning and presented action plans to create multiplier effects as trainers in introducing and teaching public-sector productivity measurement.

Workshop on Developing a Regulatory Management System Framework to Improve Public-sector Productivity

Regulations are essential tools for governments to promote well-being and economic growth. Hence, they should be continually reviewed and improved to achieve a functional regulatory management system (RMS). An appropriate RMS assesses national practices, analyzes regulatory governance performance, and identifies success factors and priority areas for reform, leading to the institutionalization of good regulatory governance under which policies result in improved economic performance in the long run. Under the transformation initiative of the APO Smart Public-sector Program, developing a good RMS framework in terms of institutions, tools, and policies will benefit citizens as well as enhance the long-term competitiveness and productivity of member countries.

The APO organized a workshop on Developing a Regulatory Management System Framework to Improve Public-sector Productivity, 5–9 August, in Manila, which was hosted by the DAP. The objectives were to: review regulatory management approaches and practices of governments; determine the gaps in regulatory administration and enforcement; develop an RMS framework; and formulate common goals for action to improve the delivery of regulatory services for higher public-sector productivity in member countries. Three resource persons from France, Malaysia, and New Zealand as well as two local speakers made presentations on various topics relating to RMS. The workshop was attended by 17 individuals from 10 member countries.

Program coverage: Definition, overview, and indicators of RMS; Approaches to and principles of RMS; Impact analysis of RMS; Principles of quality RMS and good governance; Understanding regulatory policies, tools, procedures, and institutions; and Conceptual framework of RMS. The participants visited the City Government of Paranaque and the Central Bank of the Philippines, both public-sector organizations, to apply and enhance their learning. They also drafted and presented action plans for applying the fundamentals of RMS in their countries to create multiplier effects.

Workshop on Delivering Citizen-centered Public Service and Driving Innovation

A new relationship has emerged between public services and citizens: public services are now designed with citizens in mind and from their perspectives. Citizens in the digital age are IT-savvy customers of public services who demand to be strategic co-partners who are consulted when governments formulate policies and deliver services.

Recognizing the need for greater awareness of public services based on digital innovation and citizen-centeredness, the APO in collaboration with the DAP conducted a multicountry workshop on Delivering Citizen-centered Public Service and Driving Innovation in Manila, 7–11 October. Twenty-one international and local participants from 11 APO member countries explored ways to advance a customer-centric, innovative public sector. In addition, the workshop focused on applications of digital innovation to enhance public service delivery and explored the development of novel solutions using Blue Ocean Strategy methodology.

Program coverage: Definition and evolution of citizen-centered public service delivery; Digital technology and advanced innovation practices; Linking digital technologies and productivity in public service; and Strategy development in the public sector.

International Conference on Public-sector Productivity

Governments need to reinvent themselves to meet higher expectations with scarce public resources. This is where innovation comes in. Studies indicate that innovation in internal processes, policy design and implementation, service delivery, and regulatory approaches of governments will be critical if they are to deliver services successfully while being prudent in spending budgets funded by their citizens in the most effective, efficient ways. Recent trends

ranging from changing demographics to technological advances, new economic pressures, and environmental changes have been strong catalysts for governments to think differently about how regulations and policies are developed and services provided while exploiting new opportunities and finding novel ways to solve today's complex problems.

The APO organized an International Conference on Public-sector Productivity, 14–16 November in Tagaytay, the Philippines, which was hosted by the DAP. The objectives were to: examine the concepts, applications, and results of innovation in the public sector including their implications for its productivity and national competitiveness; discuss the latest innovations in digital transformation, the future of work, process improvement, and tools and technologies; and look into the critical challenges of achieving more innovative, transformative public sectors in the region now and in the future. Six resource persons from Australia, France, Japan, the ROK, Malaysia, and the USA made presentations on innovation, digital transformation, and agility of the public sector. The conference was attended by 22 individuals from 14 member countries and another 140 local participants.

Program coverage: Defining innovation in the public sector and its approaches; Digital transformation, government decision making, and innovation; Implications of public-sector innovation for productivity and competitiveness; Innovation in serving citizens and businesses; Disruptive innovations impacting the public sector; Role of government in Industry 4.0 and smart cities; Harnessing innovation networks for better public value; Creating an innovative culture and leadership style in the public sectors of the future; and Government as a catalyst for innovation.

Training of Trainers on Big Data Analytics for Public-sector Productivity

As public-sector services receive greater scrutiny and applications of data and disruptive digital technologies expand possibilities, government officials need constant upskilling to meet higher expectations. Big data science and data analytics are no longer the exclusive tools of the private sector. All public-sector employees now need to feel comfortable in using big data analytics and other aspects of data science to meet citizens' demands.

To offer training in big data analytics to enhance efficiency in public services, the APO in collaboration with the FTPI conducted a training-of-trainers course on Big Data Analytics for Public-sector Productivity in Bangkok, 25–29 November 2019. Twenty-four international and local trainees from 14 APO member countries attended this course to develop skills in using common tools such as Excel, Qlik Sense, and Weka to perform data analysis and visualization while making predictions to solve data science problems. This will pave the way for applying those tools to make their public sectors more productive.

Program coverage: Data science; Big data analytics and data visualization; Data science maturity framework DELTA; Case studies of governmental data models; and Descriptive, diagnostic, predictive, and prescriptive analytics and applications.

Research on Measurement of Productivity in the Public Sector

Efforts to increase the productivity levels of public organizations may be hampered by the complexity in assigning costs to the products and services provided. Difficulties in defining the production costs of government operations are why the public sector is often excluded from conventional productivity measures. However, measuring efficiency in public organizations is important and receiving increasing attention from policymakers. Calls to increase the performance of the public sector are mounting to justify the allocation of resources for the provision of services, contain costs, and halt the downward revenue trend faced by most governments in the economic upheavals after the 2008 global financial crisis.

The APO conducted research on Measurement of Productivity in the Public Sector to identify key indicators along with any gaps, make recommendations on the collection of future data to provide a more complete picture of productivity in target areas, and highlight factors contributing

to productivity trends, including policies. The project outcome was the publication of a report summarizing the findings and lessons learned, now available on the APO website.

Program coverage: Investigating the measurement of public-sector productivity in health and education services through studies in the five APO member countries India, Indonesia, Malaysia, the Philippines, and Thailand.

Research on Change Management in the Public Sector

Change is necessary for all organizations to remain relevant to their stakeholders. Public-sector organizations are often perceived as resistant to change, however, as many seek to improve capacity without fundamentally altering their operations. Organizational changes in the sector occur each time new leaders, at both national and local levels, are elected. Incoming administrations appoint new officials who introduce new policies and programs. In many instances, previous policies and programs are simply discontinued, regardless of whether they were working, especially if the new administration is from a different political party. Such changes can result in wasted efforts and resources, along with insecurity and confusion among those in public service during transition periods. Change models and processes to change the culture of the public sector have recently been introduced under the banners of organizational development and institutional reform. Similarly, governments in some countries have instituted mechanisms in the sector for managing electoral transitions, including the ongoing tenure of key officials to ensure stability in the delivery of public services.

The APO started a research project on Change Management in the Public Sector in 2019 to explore practical methods and models leading to service continuity, higher productivity, and greater citizens' satisfaction. The project involves case studies of public-sector organizations in seven APO members and will be completed by April 2020.

Program coverage: Exploration of models and theories of change management applied to the public sector; Analysis of the results of the application of those models and theories to public-sector organizations; and Recommendations to enhance the overall performance of public-sector organizations within the framework of change management.

Research on Youth Employment Issues and Human Capital Development for APO Economies

In all APO member countries, the youth face more than two-fold higher unemployment rates than adults. Many APO member countries are experiencing a "youth bulge," a period in which young people are far more numerous than all other age-groups combined. Measures to ensure that the youth bulge will turn into a demographic dividend or to maximize the human capital potential and minimize the negative impact of youth employment issues are essential. Encouraging youth entrepreneurship is one approach to solve the issues of youth unemployment and underemployment. Youth entrepreneurship is not a panacea to deal with employment challenges, but it could contribute to job creation and boost innovation for the economy by fostering new, innovative models.

The APO assigned a research team of one chief expert and seven national experts from India, Indonesia, Malaysia, Nepal, Pakistan, Thailand, and Vietnam to support member countries in dealing with the challenges posed by youth employment issues. The research project focused on the study of the policies and programs initiated by governments, the private sector, and public–private partnerships focusing on youth entrepreneurship promotion. In 2019, a report on best practices, failures, and constraints of the programs and policies implemented within the past five years in the participating countries was published. Policy implications to help entrepreneurship contribute to solving the issue of youth employment, thus enhancing labor productivity and the quality of human capital, were highlighted in the final report.

Program coverage: Youth employment; Youth unemployment and underemployment; Youth entrepreneurship; Youth not in employment, education, or training (NEET); Start-up supporting policies; Innovative self-employment programs; and Skill development programs.

Research on Science, Technology, and Innovation Policies in Member Countries and implications for Productivity Enhancement

Scientific advances, technological changes, and innovative value creation are important drivers of productivity and economic growth. Building up an effective science, technology, and innovation (STI) system that can absorb technical know-how, strengthen scientific capabilities, and improve firm innovation is receiving a surge of interest from many governments. STI policies (STIPs) need to be well designed and implemented to enable STI systems to contribute their full economic potential. Recently, various socioeconomic, environmental, technological, and political trends have been influencing the development of societies and economies. The emerging trends not only are promising but also carry significant risks for the future. They pose challenges to the direction and pace of STI activities as well as the status and efficacy of STIPs.

In order to support informed policymaking in member countries, a research project on Science, Technology and Innovation Policies in Member Countries and implications for Productivity Enhancement is being conducted. It aims to determine the key trends impacting STI, review collaborative linkages among STI actors and recent developments in STIPs, and publish an outlook document focusing on strengthening future STI systems and their policy implications for APO member countries. A three-day coordination meeting of experts was held 21–23 November in Vientiane, attended by one chief expert from Japan and eight national experts from the ROC, India, Indonesia, Lao PDR, Pakistan, Sri Lanka, Thailand, and Vietnam. The meeting discussed the scope, framework, methodology, and timeline of the research. In 2019, the final report presenting future STI systems, providing policy insights for efficient interventions to boost economic growth, and making recommendations to encourage stronger linkages among STI players was finalized.

Program coverage: Key trends impacting STI systems; Review of collaborative linkages among STI actors; Industry 4.0; Society 5.0; Future-oriented technology analysis; Analysis of recent developments in STIPs; Future of STI systems; and Policy implications to strengthen technological and innovative performance.

Research on Public Policy Innovation for Human Capital Development

Many of the major drivers of transformation currently affecting global industries are expected to have a significant impact on employment, ranging from job creation to job displacement, and from heightened labor productivity to widening skill gaps. While the adjustment of the nature of work was previously mostly associated with improvements permitting efficiency gains as well as the creation of jobs, the current disruptive effects of technologies could negatively affect opportunities to participate in work if factors contributing to skill adjustment do not support the evolving demands of the labor market. Technology-driven structural unemployment is a cause of concern for developing economies endeavoring to improve productivity. Its mitigation requires the concerted effort of all actors in the labor market.

Recognizing that in such a rapidly evolving employment landscape the ability to anticipate and prepare for future skill requirements, changing job content, and the aggregate effect on employment will be increasingly critical, the APO is conducting research on Public Policy Innovation for Human Capital Development. The results are intended to show businesses, governments, and individuals how to benefit from the opportunities presented and mitigate undesirable outcomes. The project will give a comprehensive overview of human capital strategy for creating national competitive advantage, especially with the pace of change in the global employment scenario. The research got underway in 2019, and publication of the results is planned for mid-2020.

Program coverage: Innovative approaches to public investment in human capital development and its role in determining overall development; Recommendations on managing future skill requirements for human capital in member countries; and Case studies of public policy innovations for human capital development in Cambodia, India, Indonesia, Malaysia, the Philippines, Sri Lanka, and Thailand.

Research on Digitization of Public Service Delivery

With the objective of assessing the various models and initiatives adopted by member countries to digitize their public sectors, the APO started a research project on Digital Public Service Delivery for Smart Government. In addition to the focus on assessment through case studies in five selected member countries, the research will propose a set of recommendations for improving digitization strategies to be referred to by governments for increasing the efficiency of public service delivery. Another research output will be a regional outlook report on the status of smart government in the Asia-Pacific, particularly in the area of public service delivery.

A research coordination meeting was held in collaboration with the DAP, 25–27 September in Manila. It was attended by the chief expert from the ROK and national experts from India, Indonesia, the ROK, Philippines, and Thailand. They agreed that the focus of the country studies would be divided into smart welfare, smart villages, smart disaster management, open data, and integrated digital welfare services. The final outcome of the research will be published by July 2020, followed by a series of dissemination activities for targeted stakeholders.

Project coverage: Assessing the strategy for digital public service delivery; In-depth country case studies; Models of digital public service delivery; and Policy recommendations for digital transformation for public service delivery.

Research on Education for Future Industry

The future of industry will be driven by many trends interacting in complex ways including automation, globalization, population aging, urbanization, and the rise of the green economy. A report from Nesta and the Oxford Martin School estimates that roughly seven in 10 people are currently in jobs for which the future is uncertain, although occupational redesign and workforce retraining may promote growth and reduce job-related volatility.

These changes are likely to create new demands for skills in the labor force in Asia and the Pacific, which means that existing education and skilling systems will need to be made future-fit. Research from the World Economic Forum and Massachusetts Institute of Technology showed that interpersonal skills, higher-order cognitive skills, and systems skills will be central in 21st century industry. To equip the current and next generation of workers to meet the demands of future industry, member governments must explore new ways of delivering education and skills training to their citizens.

Several different arrangements for higher education, including public–private–academia partnerships, have been investigated or implemented in the Asia-Pacific and beyond to deal with these issues, often requiring cooperation among different actors. Therefore, the APO is undertaking research on Education for Future Industry to explore initiatives to reform higher education and the roles of each partner under different arrangements to meet the requirements for future industry. A research coordination meeting hosted in cooperation with the CPC was held 19–21 November in Taipei. This meeting featured seven experts in the fields of education, economics, and management from the ROC, ROK, Philippines, Singapore, Thailand, and Vietnam.

Program coverage: Research overview; Overview of broad trends and concepts in higher education for future industry and the case of Korea; Proposal for a research framework on education for future industry; Preliminary report presentations; and Discussion and finalization of the research framework and methodology.

SMART SERVICES

Training of Trainers on Smart Service and Technology for the Health Sector

With rising incomes and purchasing power, greater awareness of healthy lifestyles, and aging populations, the need for better healthcare is receiving more attention in the Asia-Pacific. People are also demanding better service provision and quality in general. Therefore, a transformation of the entire healthcare ecosystem is required, from pharmaceutical companies to makers of health devices, and from insurance providers to hospital chain operators. The use of smart technology such as connected medical accessories and health-related apps has increased markedly by both physicians and patients. Consumers, especially the millennial generation, prefer to monitor and diagnose their health anytime, anywhere through mobile apps.

A training-of-trainers course on Smart Service and Technology for the Health Sector was organized by the APO in conjunction with the NPO of Indonesia, 22–26 April in Jakarta, to familiarize participants with the latest smart service models and technologies in the era of Industry 4.0 and their impact on the health sector. The 24 participants from 13 member countries who attended were from government agencies, other public-sector organizations, NPOs, and the healthcare sector. All were involved in productivity improvement consultancy and training for service/health enterprises.

Program coverage: Cutting-edge healthcare technology; How to improve productivity by utilizing smart service and technology; Leveraging connected smart services and technology for improving health-sector value; Development of smart services and technology for the health sector in Indonesia; Policies and plans to improve health-sector productivity in Singapore; Support scheme for boosting smart service and technology in Society 5.0 and Medicine 4.0 in Japan; Trends in smart service; Technology and artificial intelligence in healthcare in Industry 4.0; Best practices of smart technology in the health sector in Singapore; and Future smart service in healthcare. To understand how Indonesia developed and applied smart services and technology for productivity improvement in its health sector, participants visited two health-related organizations: Faculty of Medicine (FKUI) Universitas Indonesia (UI), a state university; and PT. Kalbe Farma.

Workshop on Developing Standards for Smart Cities

Urbanization is a growing trend, and it is forecast that two-thirds of the world's population will live in/near cities by 2050. Demand for services in urban areas is therefore increasing rapidly, and the capacity of local governments to manage this demand is a key challenge. With more people living in proximity, smart systems and their integration are required, not only to provide the services that they need but also to do so efficiently with minimum impact on the environment. Efficient technologies and ICT are common denominators of smart cities, linking services, mobility, infrastructure, and energy.

A workshop on Developing Standards for Smart Cities was organized by the APO in conjunction with the KPC in Seoul, 25–29 March, to present the overall concept, main factors, and features of smart city solutions as well as best practices of successful smart cities, especially from the viewpoint of policy and administrative components and community engagement in smart development. The 19 participants from 15 APO members were working in national and local government units responsible for the formulation of policies, plans, and programs related to urban and city planning or from academic institutions and consultancy services involved in smart cities.

Program coverage: Overall concept, model, and standards of smart cities; Global trends in ICT for smart cities; Government policies, schemes, and best practices on smart cities in the ROK; Open data are transforming city life—unlocking innovation and economic advantage; Japanese government policy on promoting smart cities in relation to Society 5.0; Journey of Hong Kong toward a smart city; and Best practices of smart cities in Japan. To understand specific details of how the ROK develops smart cities, participants visited the Transport Operation and Information Service for the Seoul metropolitan area and Smart City Operating Center in Osan, Gyeonggi province.

APO Development Workshop for Practitioners of Business Excellence

The business excellence (BE) framework is a dynamic tool for managing organizations to raise their competitiveness and productivity. Using the framework, organizations can identify strengths and opportunities and then align management systems and processes to create an environment for sustainable, continuous improvement. One of the activities of the APO Center of Excellence (COE) on BE within Enterprise Singapore is assigning experts to member countries to help develop BE strategies for the public sector. In collaboration with the COE on BE, the APO published the *Toolkit for Trainers* and *Self-help Toolkit/Guidebook* on BE to assist in those efforts.

In conjunction with Enterprise Singapore, the APO held a Development Workshop for Practitioners of Business Excellence, 11–14 March. The objective was to develop BE practitioners who can assess the need for using the framework as a strategic management tool, plan for its adoption in organizations, facilitate organizational self-assessment using the framework, and identify and provide guidance on the use of relevant tools and techniques to improve organizational systems, processes, and practices. Fifteen participants from 11 member countries, all of whom were practitioners, consultants, and assessors from NPOs and the public and private sectors involved in applying the BE framework, attended the workshop.

Program coverage: BE initiatives and framework in Singapore; Managing and sustaining BE; Facilitating BE; Self-assessment and managing improvements for BE; and Sustaining BE. The workshop included attendance at the BE Winners Sharing Conference hosted by Enterprise Singapore.

Workshop on the Use of Smart Technology to Raise Productivity in the Service Sector

Industry 4.0 as a key supplier of cyberphysical production systems is attracting great interest worldwide. It has inspired cooperation across industries and economies to connect complementary initiatives. Industry 4.0 integrates manufacturing and service with state-of-the-art smart technology linked to logistics processes among different companies in order to optimize material flows and respond flexibly to changing customer needs and market conditions. The APO promotes the use of smart technology given its positive impact on sustainable productivity and the economy as a whole. Advances in smart technology have given rise to multimedia and online phenomena that hold great promise for productivity promotion and enhancement, information dissemination, and other applications. The use of smart technology in the service sector has been growing rapidly, and recent advances, especially in software, have made the sector a hotbed of innovation and technological progress.

The APO in conjunction with the SGPC organized a workshop on the Use of Smart Technology to Raise Productivity in the Service Sector in Singapore, 16–19 July. It examined the latest smart technologies of Industry 4.0 and their impacts on the sector and offered opportunities to exchange information on and experience in the innovative use of smart technology for raising service productivity and quality. Seventeen government officials and consultants or trainers from NPOs or consulting firms focusing on service-sector productivity improvement from 14 member countries attended.

Program coverage: Productivity in the service sector; Smart technology: The future of service organizations; and Service design for smart technology. As a new element, the workshop included four “master classes” for all participant: master class A, the business model canvas; master class B, identifying customer jobs; master class C, prototyping business models; and master class D, pitching business models.

Research on Case Studies of Diversity Management and Human Capital Strategy

Employing a diversified workforce is not only an advantage but also a challenge for management. Diversity could have both positive and negative effects on firm productivity. A strategy to manage diversity successfully creates a work environment where similarities

and differences in the workforce are included and valued. Such a strategy turns a diverse workforce into an inclusive one. The more diverse and inclusive the workforce, the greater the team collaboration and commitment to organizational performance and productivity enhancement. The organization's ultimate goal of improving efficiency and effectiveness while achieving better productivity performance can be achieved by well-satisfied, better-performing, more committed employees.

Initiated in September 2016, the research on Case Studies of Diversity Management and Human Capital Strategy was designed to assess the impact of a diverse, inclusive workforce on organizational productivity gains and competitiveness. One chief expert and six national experts from the ROC, India, IR Iran, Malaysia, the Philippines, and Thailand were commissioned to implement the research. In December 2017, a report covering best practices in strategies for diversity management and inclusiveness in organizations in both the public and private sectors was submitted. The impact of diversity and inclusion on productivity gains was analyzed in each case. The final report was published in February 2019.

Program coverage: Diversity and inclusion strategy; Human capital development; Unconscious bias; Organizational performance; and Firm productivity.

AGRICULTURE TRANSFORMATION

Special Program for Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality in Asian Countries: First Year

The APO Special Program for Capacity Building of Sustainable Food Value Chains (FVCs) for Enhanced Food Safety and Quality in Asian Countries was being conducted from 2018 to 2020, involving national capacity-building projects on productivity enhancement in agriculture and the food industry for Asian countries under a special cash grant from the Government of Japan. Three projects were conducted under this special program in 2019.

1. International Conference on Smart Agriculture and Food Safety Management in the ROC

   An international conference on Smart Agriculture and Food Safety Management was held in Taipei, 20–23 August, hosted by the CPC. It created an opportunity for attendees to discuss a wide range of topics, including recent Internet of Things (IoT) applications and digital services in agriculture, how information service platforms can be used to improve agricultural productivity, agricultural data analysis and decision support systems, and development trends in smart machinery and robotics. The 285 participants came from government agencies, research institutes, academia, smart agricultural technology service providers, and agribusinesses. Resource persons from Japan and the USA gave presentations, led the proceedings, and moderated discussion sessions.

2. National Conference on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality in India

   The APO and NPC, India, jointly organized a national conference on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality in New Delhi, 21–22 August, to create an opportunity for participants to learn about the latest technologies and best practices adopted for strengthening global FVCs; enhance the productivity, food safety, and quality of agrifood products, especially among SMEs in India; and offer a platform for participants to examine successful models and challenges related to FVC management and subsequently generate policy inputs for their governments to formulate proactive strategies to promote public–private partnerships in Indian FVCs. More than 150 participants attended the two-day conference, representing heads of food-processing units; managers of supply chains; agrifood producers' associations; agribusiness industry leaders; and government officials, policy planners, and researchers involved in FVCs. Two international resource persons from Singapore and Thailand along with 20 local experts facilitated the conference

sessions and gave presentations emphasizing the crucial importance of enhancing food safety and quality for sustainable FVCs.

3. National Workshop on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality in Mongolia
In cooperation with the Ministry of Food, Agriculture and Light Industry, a national workshop on Capacity Building of Sustainable Food Value Chains for Enhanced Food Safety and Quality was organized in Ulaanbaatar, 13–17 May, to train consultants and trainers in FVC concepts and introduce the methodology for developing food safety, quality, and innovation (FSQI) frameworks to modernize FVCs; introduce modern food safety and quality processes and possible results of improvements; provide advanced knowledge and techniques, best practices, and successful models of enhancing FSQI in FVCs; and contribute to enhancing the productivity and competitiveness of Mongolia's agrifood sector through building reliable, safe, sustainable FVCs. The workshop was facilitated by two international resource persons and three local experts.

Workshop on Building Climate Resilience in Agriculture

Agriculture is one of the most climate-vulnerable sectors of the economy. Climate change, in the form of rising temperatures, erratic precipitation, uncertain seasons, and increased intensity and frequency of extreme weather events, is expected to exacerbate food security challenges by impacting food production, disrupting supply chains, and raising prices. Consistent global warming trends and more frequent, intense, extreme weather events are occurring in many Asian countries. Among various development sectors, clear impacts are witnessed in agriculture such as declining crop yields; increasing insect, disease, and weed infestations; and declining soil properties and microbial compositions in farming systems.

To share innovative climate-resilient agricultural models and find ways to promote the adoption and scaling up of such technologies and models in member countries, the APO in partnership with the NPO of Bangladesh held a workshop on Building Climate Resilience in Agriculture, 5–9 May in Dhaka. Twenty individuals from 11 APO member countries participated. The workshop was facilitated by three international and four local resource persons.

Program coverage: Climate change, adaptive capacity, and development; Prospects and challenges of building climate-resilient agriculture; Low-carbon technologies in agriculture; Anticipated impacts of climate change on agricultural productivity and sustainability; Policies and institutional settings for promoting climate-resilient agriculture; Sustainable intensification and climate change mitigation; Extension innovations in scaling up climate-resilient farming technology; Program planning, strategy development, and investment prioritization for climate-resilient agriculture; and Impacts of climate change on rural livelihoods. Participants visited the Climate Technology Park of the Christian Commission for Development in Bangladesh, Gazipur district, and were able to observe 62 potentially adoptable technologies related to climate change adaptation and mitigation.

National Conference on Developing Sustainable and Competitive Agribusiness in Cambodia

While global and regional development is opening up opportunities in export markets, agribusiness companies in Cambodia need to raise their productivity and competitiveness to benefit from them. The enabling environment should be improved, and the roles of the government, academia, and NGOs supporting the sector should be defined to optimize synergy. This could be achieved through the development of a roadmap for the sector and capacity building of various stakeholders.

The APO in partnership with the NPCC organized a national conference on Developing Sustainable and Competitive Agribusiness in Cambodia, 5–7 March, to formulate a general roadmap with extension programs for driving the agribusiness sector into the future; develop extension programs including innovative techniques and technologies; and successfully

implement participants' action plans on utilizing the concepts, techniques, technologies, and best practices introduced at the conference in their own farming operations and enterprises.

Seventy participants from the Ministry of Agriculture, state agricultural universities, agriculture agencies, and agribusinesses, especially SMEs, state enterprises, NGOs, and NPCC staff as well as a resource person from the USA attended. The project was a follow-up to the APO workshop on Advanced Agribusiness Management Course for Executives and Managers held in Indonesia in 2018.

Program coverage: Global trends in agribusiness and implications for Cambodia; Current government policies and programs to support agribusiness; Credit and financing facilities for agribusiness; Successful agribusiness models (rice milling and exporting company, black pepper production and export); Strategy formulation for enhancing the competitiveness and sustainability of agribusiness; Role of incubation centers in the development of agribusiness; Creating an enabling environment for competitive agribusiness industries; and Value chain approach to enhancing the competitiveness of agribusiness.

Organic Agroindustry Development Leadership Course in Asia

Organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. Organic solutions, comprising packages of intelligent and innovative farming techniques, sustainable fair food chains, and principles that strengthen small-scale farmers and empower rural economies, are being adopted globally by governments and local authorities, carried out by millions of farmers, and supported by a rapidly increasing number of consumers. Leadership and institution building are the key factors for greater sustainability in agriculture and development of the organic sector. However, the potential benefits of organic agriculture have not been realized fully.

The APO in partnership with the NPCC offered an Organic Agroindustry Development Leadership Course in Asia in the format of a training-of-trainers course. It was held in Phnom Penh, 9–13 September, with the objectives of deepening participants' understanding and skills in promoting and leading organic agroindustry for improving the productivity and sustainability of agriculture in their countries, familiarizing them with recent developments in the global organic agroindustry, and providing opportunities for networking and sharing of best practices. Twenty-three participants involved in organic agroindustry from 14 countries as well as three international resource persons attended.

Program coverage: Organic agriculture principles; Overview of diverse organic systems; Sustainable organic value chains; Organic guarantee systems; Participatory guarantee systems and alternative guarantee systems; Trustworthiness of organic produce in urban markets; Hurdles in organic value chains and optimizing distribution with the gravity model; Advocacy principles and international organic advocacy; Organic policy development; and Role of innovation in organic agriculture. A site visit to the moringa processing plant of Wot-Natural Khmer Moringa, located in Phnom Penh, was included in the course.

Workshop on Innovations in Agribusiness for Young Entrepreneurs

Entering the era of Industry 4.0, agriculture has become more digitized and scaled up. Processes across agricultural supply chains from production to sales have become hyperconnected, which allows innovations and entrepreneurialization. This provides tremendous opportunities to young people at the forefront of these trends to lead the transformation with their digital literacy. With their entrepreneurship mindsets and millennial-generation advantages, the young are not bound to past practices and like to think outside of the box, provide fresh perspectives on problem analyses, and devise new solutions in agriculture.

To raise awareness of innovations in agribusiness and agritechnology as entrepreneurial opportunities as well as to review emerging startups in agrifood industries to gain business insights for creating an enabling environment for young agripreneurs, a workshop on

Innovations in Agribusiness for Young Entrepreneurs was held 1–5 July, in Taipei, the ROC. Twenty-nine participants from 12 countries attended. The workshop was facilitated by three APO resource persons from Japan, the Netherlands, and the UK who shared lessons in the areas of agribusiness, entrepreneurship and innovation, and agritechnology applications. The workshop promoted and supported individual engagement as much as possible, which successfully created voluntary, proactive participation throughout the sessions.

Program coverage: Understanding innovation and entrepreneurship; Youth characteristics and entrepreneurship development; Innovative agritech usage across agriculture supply chains; Noble agricultural businesses for infusing value in alternative food/feed sources; Business model innovation in agriculture and rural business; Finance procurement for youth entrepreneurship; Snapshots of policies on youth agribusiness; Facilitating collective actions for youth entrepreneurship; and ROC cases of rural youth entrepreneurship support by the Council of Agriculture (COA), Executive Yuan.

The workshop featured two site visits. At FuHsiang Cactus Garden, the manager made a presentation on brand and business model introduction and applications of an innovative agritech management system. New Farmers' Market, operated by the Xinpu Town Farmers' Association, provided an opportunity to observe community-based agribusinesses in action.

4th International Conference on Biofertilizers and Biopesticides: Integrated Pest Management

The use of chemical fertilizers and pesticides has had negative impacts on human health, food safety, the environment, and natural resources. Excessive or improper use of chemical compounds can cause irreparable damage. Integrated pest management (IPM) is an ecosystem approach to crop production and protection which combines different management strategies and practices to grow healthy crops and minimize the use of chemicals. IPM programs can significantly reduce the risks related to pesticides while improving the quality, health, and welfare of the environment. The integrated use of biofertilizers and biopesticides (B&Bs) lowers the overall environmental costs of crop cultivation in the long term and contributes to cleaner, greener production by reducing the need for agrochemicals.

To share and adopt/promote innovative IPM technologies in member countries, the APO in partnership with the CPC and COA, Executive Yuan, organized the fourth International Conference on Biofertilizers and Biopesticides: Integrated Pest Management in Pingtung, 20–23 August. Forty-eight participants from 13 APO member countries and more than 100 observers as well as six international and two local resource persons attended.

Program coverage: Innovative IPM approaches for organic farming in Europe; Biopesticide-based IPM strategies for safer vegetable production in Southeast Asia; Applications and technology transfer of probiotic B&Bs for crop healthcare; Innovative biofertilizer and microbial biotech applications for soil and plant health; Case study of research, development, and application of commercial biopesticide products: Case of Taiwan; Innovative B&B methods in Japan; Business opportunities for foreign B&B products in IPM; and Biocontrol of rice insect pests through ecological engineering. Participants visited the Kaohsiung District Agricultural Research and Extension Station of the COA, Taiwan Banana Research Institute, "The 96 Greenhouse" melon field under IPM, Advanced Green Biotechnology Inc., and the Exhibition Center of Ornamental Aquaculture of the COA to observe current real-world IPM applications and understand how they could be adapted to different agricultural operations.

Workshop on Rural Community Development for Sustainable and Inclusive Growth

Discussions on rural development must address diverse aspects. The need for economic improvement and social inclusion is widely agreed on in those discussions. Without opportunities for income generation, sustainability cannot be achieved. Productivity enhancement is another method to develop rural economies. With shrinking rural populations, enabling older groups

to improve their agricultural productivity becomes more important. Social inclusion is also required for sustainable community development. For example, most rural women do not have equal access to agricultural technologies, investment, and production and distribution facilities. Therefore, the social inclusion of underprivileged groups is now receiving widespread consideration in both developing and developed countries.

To raise awareness of the need for sustainability and inclusiveness in enhancing productivity in rural areas as well as to review emerging approaches and successful cases of sustainable rural economies and inclusive social protection for strategic action development, a workshop on Rural Community Development for Sustainable and Inclusive Growth was held 18–22 November in Nadi, Fiji. Twenty-two participants from 14 countries attended. Three APO resource persons from Japan, Uganda, and the UK facilitated workshop sessions. Diverse case studies in Asia, Africa, and Europe were reviewed to share lessons on rural community development frameworks, participatory governance, asset-based development, and government policies and initiatives for rural revitalization. Stakeholder participation and management were emphasized throughout the course as means to achieve development for all walks of life in rural societies.

Program coverage: Framework and perspectives of sustainable and inclusive rural community development; Developing and attracting businesses with rural community resources; Sustainable rural revitalization through job creation and resident-initiated projects; Participatory governance and inclusive rural community development; Identifying strengths within rural communities through asset-based development; Enhancing the health and nutrition of rural residents; and Government policies and initiatives for rural livelihood revitalization in Africa, Japan, and Europe. A site visit was organized to Wang Chao Farm, a noni (*Morinda citrifolia*) farm providing employment to nearby settlements; Mr. Sunil's Farm, a model of utilizing unused land to produce cash crops; and Viseisei, a traditional Fijian village where indigenous people self-sufficiently generate household income by employing women who use local resources to create handicrafts.

Workshop on Accelerating Agribusiness Startups

Food and agribusiness have huge economic, social, and environmental impacts. Opportunities in agribusiness have expanded substantially due to the globalization of trade, the Asia-Pacific region's rising incomes, and increasing population. These developments have led to widespread interest in this sector and are opening up various opportunities as well as numerous challenges. In order to fuel the growth of innovative ideas in the agriculture sector, it is important to support startup accelerators in the early stage through education, mentorship, and financing or connecting them with potential investors.

To enhance understanding of innovative approaches to planning and managing agribusiness startups and to share various models and innovative ideas to accelerate food and agribusiness startups in member countries, the APO in partnership with the Ministry of Agriculture and Ministry of Manpower of Indonesia and Cornell University, USA, organized a workshop on Accelerating Agribusiness Startups in Yogyakarta, 11–15 March. Twenty-three participants from 15 countries as well as six international and one local resource persons attended.

Program coverage: Innovative approaches and strategies for food startups/SMEs; Digital technologies for building smart agrifood value chains and integrating startups/SMEs; Small business accelerators: A global perspective; Business insights of the competitive entrepreneur; Creating an enabling environment for successful business of agrifood startups and SMEs; Future of food value chains; Case studies of millennial food/agribusiness startups; and What all startups should know about strategy (strategic thinking and marketing strategy). As a practical follow-up to the workshop presentations, site visits were hosted by Paguyuban Mitra Turindo, a salacca fruit growers' group; and Sabila farm, a dragon fruit agritourism operation in Turi, Sleman region.

Workshop on Agricultural Transformation

Transformation is necessary to enhance the productivity and sustainability of Asian agriculture and make agribusiness and food-industry enterprises in APO member countries more

competitive. In January 2019, the *APO Agriculture Transformation Framework* was circulated among members. It is aimed at enhancing food security and meeting future food needs in the Asia-Pacific region through increased productivity, quality, and innovation in agrifood systems, leading to improved rural livelihoods. Member governments have undertaken initiatives on agricultural transformation, but the results have been mixed. There is a need to understand the main drivers, major issues and challenges, and key success factors in agricultural transformation in the national and local contexts. Member countries can learn a lot from one another's experience.

The APO along with the Indonesian Ministry of Manpower and Ministry of Village, Development of Disadvantaged Region, and Transmigration organized a workshop on Agricultural Transformation in Indonesia, 30 September–4 October, to enhance participants' understanding of its roles in improving productivity and sustainability in the sector, examine the main drivers of and key success factors in agricultural transformation, share different transformation models, and identify steps for accelerating the transformation in member countries. Twenty-two participants from 15 countries as well as resource persons from Japan and the ROK attended.

Program coverage: APO Agriculture Transformation Framework; Key concepts and issues/challenges in agricultural transformation; The role of government institutions in supporting agricultural transformation; Good postharvest packaging technology to add value; Precision agriculture; Smart technologies in agriculture; Advances in digital agriculture; Public–private partnership investment opportunities in agricultural transformation; and Encouraging private investment in low-cost technologies and services. Participants visited a smart farm to observe its operations and learn about its future transformation plans.

Multicountry Observational Study Mission on Sustainable Food Value Chains

An FVC is a series of activities to create and add value at every stage from agricultural production, manufacturing, processing, and distribution to consumption. Recently, the environment surrounding FVCs has been changing. For example, increasing consumer incomes lead to higher demand for better-quality, safer fresh food. In addition, changing lifestyles have resulted in more demand for healthy, convenient food and small-sized package delivery. Therefore, to establish sustainable FVCs, adaptation to dynamic social trends is necessary.

The APO organized a multicountry observational study mission on Sustainable Food Value Chains in Japan, 22–25 April, to promote the adoption of best practices for the development of sustainable FVCs in member countries. The study mission was conducted under a special cash grant from the Government of Japan. Sixteen participants from relevant government agencies, the food industry, NPOs, and academic institutions of 10 member countries, along with nine resource persons, attended.

Program coverage: Trends in FVCs and challenges in the development of sustainable FVCs; Promotion of digitization of fresh food transactions in Japan; FVCs in Asia; Japan's global FVC strategy; and Implementation and utilization of radiofrequency identification (RFID). Site visits were conducted to observe food logistics with RFID technology, new wholesale market facilities, and maintaining cold chains for perishables.

Multicountry Observational Study Mission on Good Agricultural Practices and Advanced Postharvest Handling Technologies

The Good Agricultural Practices (GAP) standard was developed to manage production processes in agriculture so that food safety, environmental protection, and fair labor practices are ensured. GAP certification has become an important determinant of consumers' choices of agricultural products. More importers are requiring exporters to have GAP certification. Major international events such as the Olympic and Paralympic Games also often insist on GAP certification for their food procurement. Therefore, GAP certification has become more important for agricultural producers than ever.

The APO organized a multicountry observational study mission on Good Agricultural Practices (GAP) and Advanced Postharvest Handling Technologies in Japan, 10–14 June, to promote GAP certification and the adoption of best practices for the development of postharvest handling technologies in member countries. The study mission was conducted under a special cash grant from the Government of Japan. Eighteen participants from relevant government agencies, the agriculture sector, NPOs, and academic institutions of 11 member countries, along with seven resource persons, attended.

Program coverage: Introduction to GAP; Overview of GAP; Food safety and GAP; Farm management, labor safety, environmental protection, human rights and welfare, and GAP; Challenges to GAP of the Fukushima prefectural government; GAP management in Marusei Fruit Farm; GAP certification acquisition by Haneda Peach Farm; Development of the "Delicious Tomato"; Postharvest handling of cucumbers by JA Miyagi-Tome; and GAP and food procurement for the 2020 Tokyo Olympic and Paralympic Games. Site visits were conducted to observe GLOBALGAP-certified farm operations, sensor selection on a tomato farm, a cucumber sorting center, and a restaurant specializing in GAP-certified agricultural produce.

National Conference-cum-Workshop on Enhancing Good Agricultural Practices Implementation in the Mongolian Agriculture Sector

Under the provisions of the Mongolian Food Safety Law 2012, every producer involved in the primary production of agricultural raw materials is obliged to implement GAP and good hygiene practices. However, the government has not formulated and adopted a national GAP scheme and there is no common understanding among producers, consumers, the government, and NGOs.

The APO in partnership with the MPO and Mongolian Ministry of Food, Agriculture, and Light Industry organized a national conference-cum-workshop on Enhancing Good Agricultural Practices Implementation in the Mongolian Agriculture Sector in Ulaanbaatar, 15–17 January, to train producers and build the capacity of key stakeholders in GAP for fruit and vegetables. It helped reach a consensus among stakeholders on the adoption of GAP scheme standards. The 80 participants were representatives of producers' associations and family farmers, government officers including those in local government units and the National Agency for Standardization and Metrology, managers of food-processing companies, representatives of the Mongolian National Chamber of Commerce and Industry, and other stakeholders in charge of GAP and organic agriculture. A resource person from the ROK led the conference-cum-workshop. The project was a follow-up to the APO Training of Trainers in the GLOBALGAP Standard for Greater Market Access held in Pakistan in 2016 and self-learning e-course on GAP in 2017–2018.

Program coverage: Experiences and achievements in the development of sustainable agriculture worldwide; Product safety in primary agricultural production; Principles of risk assessment for primary agricultural production; Basic technical requirements for introducing GAP in farming; Basic technical requirements for introducing GAP in livestock production; General information about worldwide GAP certification schemes; Structure of the worldwide GAP standard, general requirements for farmers, and requirements for fruit and vegetable production; Worldwide GAP standard requirements for livestock production: Requirements for dairy cattle breeding and sheep breeding; Implementation of quality management in small and microenterprises engaged in primary agricultural production; and Ways to harmonize organic agricultural production standards with GAP standards.

Workshop on Value-added Agriculture

Value-added agriculture is an important strategy to promote inclusive development through transforming conventional agriculture into agricultural entrepreneurship, increasing farm productivity and profitability, reducing food losses and waste, generating off-farm employment opportunities in rural areas, and reducing rural poverty. It generally includes manufacturing

processes that increase the value of primary agricultural commodities or the economic value of a commodity through production processes, e.g., organically grown commodities. Value addition is usually a worthwhile investment because it generates higher returns, allows penetration into new, potentially high-value markets, extends the production season, and helps develop brand loyalty.

To familiarize participants with emerging global trends in value-added agriculture and share successful models of value addition to agricultural commodities for making efficient use of raw materials, the APO in partnership with the NPO of Pakistan organized a workshop on Value-added Agriculture in Islamabad, 18–22 November. Twenty-two participants from 10 member countries as well as two resource persons from Malaysia and Sri Lanka and two local experts attended.

Program coverage: Key concepts in value-added agriculture, recent developments, and global trends; Promoting value-added agriculture in Pakistan: Quality, safety, and quality assurance certification for value addition; Innovative value-addition technologies for food packaging and marketing; Identification of successful marketing strategies for value-added agricultural products with regional and global experience; Successful examples of value-added agriculture; Branding of value-added agricultural products; and Niche and direct marketing strategies for value addition. Participants visited Fauji Cereals, which produces and markets a variety of breakfast cereals including those in the ready-to-eat and ready-to-cook categories.

Workshop on the Formulation and Study of Spatial Development, Climate Change, and the Environment for Agricultural Transformation

The natural resources and physical endowments of a landscape determine its potential for settlement, agriculture, forestry, mining, and urban development. The sustainable use of land depends on natural resources and physical attributes without causing significant degradation of the resource base and environment. However, land use sustainability, particularly in relation to agriculture and food security, has become increasingly difficult. Climate change, increasing populations, growing urbanization and industrialization, and poor governance are among factors that have changed the spatial landscape and put stress on the natural environment. The need to expand settlements for increasing populations and related services and infrastructure as well as for industrialization is resulting in the conversion of prime agricultural lands into other uses; forested areas are also being converted to food production. The integrity of the environment, the sustainability of agriculture, and thus food security are therefore at stake.

To introduce a framework for enhancing agricultural transformation and productivity and introduce new approaches and technologies, the APO in partnership with the DAP organized a workshop on the Formulation and Study of Spatial Development, Climate Change, and the Environment for Agricultural Transformation, 18–22 November in Manila. It was attended by 20 participants from 11 member countries, with three resource persons from India, Vietnam, and the USA.

Program coverage: Framework for agricultural land suitability and sustainability; The environmental context of agricultural productivity: Issues, challenges, and impact of climate change, population, and urbanization on spatial development; Introduction to smart agriculture: Framework for promoting transformation for sustainable productivity and food security; and Smart technologies in agriculture transformation: Basic principles and maximizing opportunities for smart agriculture. Participants visited the field site of Project SARAi (Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines), which transfers science-based crop technologies and protocols to farmers after field testing. Participants then analyzed the technologies observed when devising sustainable models for agricultural transformation in their action plans.

Asian Food and Agribusiness Conference: Smart Food Value Chains

FVCs refer to interrelated activities of stakeholders throughout the supply chain to create or add value exceeding all costs invested in the final products. FVCs are a strategic approach

to maximize product value and appeal to customers. Therefore, well-established FVCs lead to business success, financial stability, and social benefit for reciprocal economic activities, which requires a business strategy for improved product quality, innovation, market branding, etc. Smart methods like agricultural technologies, food distribution, management innovation, and strategic alliances are critical for success.

To promote smart practices in value chain development and management and discuss strategic alliances to systematize value-based food supply chains, the APO organized the Asian Food and Agribusiness Conference: Smart Food Value Chains, 11–13 June, in Bangkok. Forty-three participants from 13 countries attended. The conference was facilitated by six APO resource persons from Japan, the Netherlands, New Zealand, Singapore, the UK, and USA.

Program coverage: Novel technologies to add value to food products; Increasing food safety and quality with advanced logistics management systems; Blockchains for food traceability and supply chain management innovation; Value chain development model in the Netherlands; High-end food for general consumers; Big data analytic tools for the agrifood industry on open data sources; Food innovation and food science multidisplinarity; Vertical integration of agrifood supply chains; Establishing a value chain ecology for regionally produced food: Partnerships with local SMEs; Emerging food trends; and Bringing disruptive technologies and a new model for agrifood value chains.

Workshop on Smart Farming Models

Smart agriculture is the use of new, advanced technologies within the agrifood system to promote sustainable productivity by allowing farmers and other stakeholders to make more informed, appropriate decisions. Technologies like big data, digital technologies, and analytics are important components of smart farming. Smart farming equipment makes operations easier and more convenient, especially for the youth, elderly, and women. Smart farming can minimize natural resource degradation and carbon footprints and address extreme weather conditions, climate change, and other serious threats. The use of smart technology also gives rural farmers and SMEs access to the latest information on agrifood markets, enhancing their profitability. The adoption of smart agriculture/smart farming can contribute to overall sustainable rural development.

To broaden participants' understanding and skills in promoting/adopting successful smart farming models in their countries, share the APO Agriculture Transformation Framework (APO-ATF), and explore opportunities for its adoption by member countries, the APO in partnership with the FTPI organized a workshop on Smart Farming Models, 4–8 November in Bangkok. Twenty participants from 13 countries attended, and three international and one local resource persons led the workshop.

Program coverage: Key concepts, global trends, and the future of smart farming; Digitization of the agricultural value chain; the APO-ATF and smart agriculture readiness of APO member countries; Connecting ICT techniques to smart agriculture: Strategies and implementation in Taiwan; Smart agriculture solutions for farmers with agrimaps; Precision agriculture technologies in farm production; Digital agriculture policy framework and enabling environment considerations; and Advances in smart digital agriculture. Participants visited Wangree Health Factory Company Ltd., a plant factory in Nakornnayok province, where they had the opportunity to observe and ask questions about its modern high-value crop production systems.

Workshop on Trends in the Development of Traditional Craft Villages in the Industry 4.0 Era

Craft production benefits rural societies in many ways. Household labor is involved in making and selling handicrafts produced with accessible, affordable rural resources. That resource availability has allowed many Asian villages to continue long cultural and regional craft histories. Craft village development has strong linkages to tourism. As tourism demand has increased,

craft tourism villages have seen rising incomes, leading to economic revitalization and greater self-sufficiency of rural areas. Some governments have therefore made considerable efforts to scale up craft tourism as a successful model of community-based development.

To promote effective practices in increasing craft village competitiveness such as technological advances and business innovations, as well as to disseminate knowledge of craft village development as a strategy for economic revitalization, a workshop on Trends in the Development of Traditional Craft Villages in the Industry 4.0 Era was held 2–4 October in Ho Chi Minh City, Vietnam. Twenty-three participants from 13 countries attended. The workshop was facilitated by three APO resource persons from Australia, Canada, and India who shared lessons in craft business innovation, craft tourism development, and community revitalization by attracting talented craft artisans. The workshop promoted IT applications for digital marketing and new manufacturing technologies for high-quality products.

Program coverage: Review of traditional craft villages and their evolution; Digital advances and technologies for scaling up craft villages and products; Forming strong partnerships to increase the importance and viability of the craft sector; Innovative approaches to value addition for handicraft items through product development and customer-driven design; Building a craft destination through experiential tourism marketing; Snapshots of popular craft tourism activities; and Developing craft village clusters and networks for strategic alliances and synergy. The workshop included a visit to Tu Bon Lacquer One Member Co., Ltd., a craft company producing lacquerware such as paintings and decorative items. The owner presented new production machinery, the company's business model, and opportunities for community handicraft workers. The participants then observed production processes and workshop facilities.

Workshop on Applications of Smart Organic Agriculture Models and Traceability Systems for Agricultural Products

Smart agriculture or smart farming mostly denotes the application of IoT solutions in agriculture. IoT-based smart agriculture/smart farming is highly efficient when compared with the conventional approach. Those solutions not only target conventional, large agricultural operations but could also be new levers for growing trends like organic farming, family farming, etc. Assuring consumers of the authenticity and safety of organics is critical for successful commercial marketing and associated agribusinesses. This requires trusted food traceability systems that can track and monitor food products along the entire value chain including the integrity of farm inputs, food production at farm level, and harvest and postharvest activities. Blockchain and IoT technologies, which involve all parties in a smart agriculture ecosystem, can help in the development of trusted, self-organized, open, ecological food traceability systems.

To broaden participants' understanding and skills in promoting/adopting successful smart organic agriculture models in their countries and provide opportunities for networking, the APO in partnership with the Vietnam Certification Centre (QUACERT) and VNPI organized a workshop on Applications of Smart Organic Agriculture Models and Traceability Systems for Agricultural Products in Hanoi, 7–11 October. Twenty-three participants from 16 countries as well as three international and one local resource persons attended.

Program coverage: Key concepts and global trends in smart organic agriculture technology adoption; Applications of smart agriculture technologies in organic farming; Web-based smart traceability systems by different regulatory bodies for import and export of organic products; Applications of blockchain technology in organic agriculture traceability systems; and The APO-ATF. Participants visited the Future Generation Company Limited, located in Phu Tho, Phu Tho province, where they had the opportunity to observe its tea farm and modern processing plant.

Research on Successful Agribusiness Models: Case Studies of Value Chain Analysis for Agroprocessing Enterprises

Agribusiness is becoming an increasingly dynamic sector susceptible to the vagaries of nature and markets. To stay competitive, agribusinesses must explore new business models and

organizational structures to increase their efficiency, productivity, and sustainability and strengthen their market positions. They need policymakers, executives, and managers who have an international perspective and are equipped with the knowledge and skills to respond to actual issues arising from rapid changes in the business environment. Thus, today's agribusinesses must operate in a rapidly changing, volatile, technology-driven, consumer-focused environment. Developing an understanding of the forces that drive change is critical to the formulation of successful public policies and private strategies to help agribusinesses prosper.

Initiated in July 2018, the Research on Successful Agribusiness Models: Case Studies of Value Chain Analysis for Agroprocessing Enterprises was designed to study selected cases of value-adding agribusiness and food-processing industries as well as innovative institutions and to develop the research results into technical diagnostic-prescriptive resource materials to be used in APO and partner institution workshops on agribusiness management and related courses. This research project was successfully completed in August 2019 with the cooperation of the Dyson School of Applied Economics and Management, Cornell College of Business, under a Memorandum of Understanding between Cornell University and the APO.

This resource paper offers a holistic consideration of evolving innovative institutions that shape agroindustry development in the Asia-Pacific. It identifies over 1,000 institutional arrangements in APO member economies with analyses of their successes and challenges. Lessons learned from the innovative initiatives presented can facilitate transformation, accelerate economic growth, reduce rural poverty, and promote food safety among agroindustries in the region. The paper will be available on the APO website in 2020.

Research on Smart Agricultural Transformation for APO Member Countries

The APO initiative to transform agriculture is a comprehensive effort to respond to the most pressing challenges faced while maximizing the opportunities they present. Transforming agriculture can enhance its role as a primary connection between people and the planet. The initiative can also help achieve multiple UN Sustainable Development Goals. However, certain prerequisites must be met for optimal agricultural transformation. Integrating transformation strategies into national economic development plans is one necessary condition but not sufficient in isolation. Other readiness factors must be addressed for the transformation to be successful, and they will be identified in the research on Smart Agricultural Transformation for APO Member Countries for maximum impact.

A research project coordination meeting was held in Tokyo, 30 September–2 October, primarily to discuss methods to assess member countries' readiness to transform their agriculture sectors to make them more productive. It was guided by chief experts from the ROC and the Philippines and attended by national experts from India, Indonesia, Pakistan, Thailand, and Vietnam. They formulated a set of indicators for readiness assessment that will be used to analyze gaps as well as to benchmark against advanced transformations in other countries. The assessment is directed toward the adoption of smart agriculture which can be replicated or referred to by others when embarking on their own transformation processes. The research is also intended to identify the institutional arrangements and mechanisms required to reap the maximum benefits from transforming the sector. The final research output will be a set of strategy and policy recommendations to help speed up the adoption of smart agriculture tools and techniques. After report publication by July 2020, the research project will be followed by a series of dissemination activities for targeted stakeholders.

Project coverage: National readiness assessment for smart agricultural transformation; Country case studies on smart agricultural transformation; and Policy recommendations to move toward smart agricultural transformation.

FUTURE FOOD

Workshop on Food Safety Regulations and Related Issues

Safe, nutritious food is a basic requirement for human health. Foodborne hazards include pathogenic bacteria, viruses, parasites, and harmful toxins and chemicals, causing diseases from digestive tract infections to cancer. The WHO conservatively estimates that 600 million worldwide become ill annually after eating contaminated food. This impedes socioeconomic development, overloads healthcare systems, and damages trade and tourism. Economic opportunities are lost to countries not able to meet international food safety standards, hampering sustainable development.

Global quality assurance for agrifood items is a requirement for producers. Each government has its own definition of food risk and establishes food safety management agencies to play regulatory and monitoring roles. Governments also try to harmonize food safety regulations to maintain the flow of goods through supply chains. To promote new food safety initiatives, regulations, and certification policies, an APO workshop on Food Safety Regulations and Related Issues was held 16–20 December in Vientiane, Lao PDR. Twenty participants from 12 member countries attended. The workshop was facilitated by three APO resource persons from Singapore and India who shared their knowledge of food safety regulations, GAP, and safety standards.

Program coverage: Overview of international food safety standards and regulations; Current issues and challenges in Asia; Key emerging trends in food safety management; New safety initiatives and challenges; Importance of quality assurance and food safety in modern food production systems and global trends; Challenges of standards and conformity assessment in the food sector; Managing risks in import and export of food; Update on the Food Safety Modernization Act 2011 and Global Food Safety Initiative; Emerging trends in food regulation; Issues and challenges faced by farmers and SMEs and capacity building of SMEs in the agrifood industry for better adoption of food safety regulations; Role of accreditation in the food sector; Impact of climate change on food safety systems; and Managing food fraud in supply systems. The workshop included a visit to Lao Brewery Co., Ltd., which has a more than 80% national market share. A company director explained its operations and how it maintains quality and adheres to safety regulations throughout its supply chain.

Capability Development

STRATEGIC FORESIGHT

Conference on the Future of Work

Work plays a central role in modern life. Many social benefits are delivered through jobs, from the more tangible ones such as healthcare and wages to the less tangible, although also important, such as social status and a sense of community, purpose, and meaning. However, as widely noted, the nature of work looks set to change in fundamental ways in coming decades. Analysts are mixed when suggesting possible futures. Will we see sharp jumps in productivity and enhanced prosperity? Or will unravelling social contracts, mass unemployment, and increasing gaps between the global North and South be the norm? Or is some mix of these outcomes and others likely to prevail? Amid this fog of uncertainty, what is apparent is that no single outcome is inevitable. Proactive strategies and thoughtful action may leverage new opportunities and manage negative consequences to improve people's lives.

To expand thinking around the future of work and prepare organizations for potential disruptive change, the APO in cooperation with the CPC organized a Conference on the Future of Work. It was held 3–5 September in Taipei with 34 participants from 14 APO member countries. They explored the threat of automation and technological unemployment, possibilities of reskilling and lifelong learning, and other issues associated with the changing world of work.

Program coverage: Automation; The innovation economy; Industry 4.0; Sustainability; Changing demographics; The future of learning; The postwork era and basic income; and The future of human resources and talent. The conference presentations, panel discussions, and interactive group activities were supplemented by a site visit to the Industrial Technology Research Institute.

Forum on Disruptive Technologies and Technology-driven Productivity

Disruptive technologies are innovations that uproot established processes or offer revolutionary products or services that can spawn entirely new industries. These technologies can change fundamental features of economic, social, and political life, often in unanticipated ways. Some examples of emerging disruptive technologies include quantum computing, artificial intelligence, big data analytics, digital agriculture, blockchains, and autonomous vehicles. If policymakers and implementers are left unaware of the opportunities and risks associated with these technologies, then they will be unable to formulate future-ready strategies.

To enhance member governments' capacity to anticipate the impacts of such new technologies, the APO organized a forum on Disruptive Technologies and Technology-driven Productivity in Jakarta, 26–28 March. It was organized in partnership with Indonesia's Directorate of Productivity Development and Directorate General of Training and Productivity, Ministry of Manpower. International speakers included: Red Dot Robotics CEO Joseph Lew from Singapore; Kasikorn Bank Executive Vice President Silawat Santivisat from Thailand; Tokyo Institute of Technology Professor Naohiro Shichijo from Japan; Edge InfoSys Vice President B.M. Avinash and India Network for Basic Income Coordinator Sarath Davala from India; and William Doug Beynon, Entrepreneur in Residence, University of Waterloo, from Canada. Indonesian experts Irzan Raditya, CEO of Kata.ai, and Liris Maduningtyas, CEO of Jala Tech, also gave presentations. Around 70 participants came from 11 APO member countries to share their experiences and learn more about disruptive technologies.

Program coverage: What is disruptive technology? An overview; Artificial intelligence and the future of data; Industry 4.0: The Internet of Things, big data analytics, and smart factories; Disruptions in transport: Ride-sharing, autonomous vehicles, and other innovations; Quantum computing: Implications and issues; Panel discussion on Disruptive

Technology and the Future of Productivity in Asia; Entrepreneurship and commercialization of disruptive technology; Building scenarios with smart strategies; Harnessing disruptive technologies for MSMEs; Technology in aquaculture; Primer on a universal basic income; Panel discussion on Managing Technological Disruption; and Blockchain initiative introduction and the Bangkok experience.

Training of Trainers in Strategic Foresight and Scenario Planning for Development Planners

The world today seems more turbulent than ever before. Organizations, both public and private, have been caught off guard by economic volatility, unexpected political events, natural disasters, and disruptive technological change. Additionally, decisionmakers often face cognitive limitations such as confirmation bias and groupthink which lead to flawed assumptions. Those assumptions are often not revisited or revised as events unfold. These external and internal conditions make strategy development difficult. However, strategic foresight and scenario planning offer means to contend with such challenges. By generating novel yet plausible alternative pictures of the future, organizations can disrupt their calcified mental models and manage uncertainty more effectively.

To help improve the planning and strategy development processes, the APO in cooperation with the MPC organized a Training of Trainers in Strategic Foresight and Scenario Planning for Development Planners. The course was held from 26–30 August in Kuala Lumpur with 24 participants from 14 APO member countries.

Program coverage: Introduction to future thinking; Environment scanning; Scenario framework and development; Generating focal questions; Backcasting; and Scenario presentations.

Research on Construction of a Productivity Forecasting Model Framework

Global productivity is in a state of flux, with the growing polarization of labor opportunities between high- and low-skilled jobs, unemployment and underemployment especially among young people, stagnating incomes, and income inequality. Migration, automation, digital platforms, and artificial intelligence are set to disrupt existing patterns of work. Understanding these shifts can help policymakers, business leaders, and workers to proactively manage the transition to a new future. Conversations, debates, and analysis around the future of work and productivity are increasingly common in major media channels, policy forums, and academia. Despite international attention, much of the analysis takes the perspective of North America and Europe and does not reflect the unique challenges faced by the Asia-Pacific region.

To help member governments make sense of the future of productivity in Asia and the Pacific, the APO initiated research on Construction of a Productivity Forecasting Model Framework, which adopts a foresight-based approach. Reos Partners, based in Australia, collaborated in developing the research format, analyzing the results, and writing the final report. A range of plausible futures was explored by synthesizing and analyzing the secondary literature and interviewing experts from the ROC, India, Japan, the ROK, Malaysia, Singapore, Thailand, and the USA. By bringing together multiple perspectives, this research is meant to empower decisionmakers and policy planners in using new ways of thinking about, discussing, and implementing strategic changes that are compatible with the future of work. At the time of writing, the final report was being prepared for publication on the APO website.

Project coverage: Horizon scanning of trends in the future of work; Analysis of secondary literature on the future of work; and Interviews with experts.

SUSTAINABLE PRODUCTIVITY

Workshop on Sustainable Productivity

To provide member countries with a platform for sharing knowledge on how to tackle issues related to national productivity enhancement from a forward-looking perspective and therefore make growth sustainable in the long run, since 2017 the APO has organized a series of activities under the banner of sustainable productivity. In addition to research projects, a workshop on Sustainable Productivity was held in Tokyo, 16–20 December, attended by 18 participants from 15 APO member countries and facilitated by resource persons from Australia, India, the ROK, and Malaysia. Most participants had public-sector backgrounds, representing agencies and ministries managing productivity and competitiveness issues at national level. Some, however, were selected to attend because they were expected to support the development and/or implementation of national productivity master plans drafted in cooperation with the APO as part of its policy advisory role.

The main theme of the workshop was that productivity improvement must be a forward-looking, long-term effort. What counts is not only how productive we are at a certain time but also the likelihood of continuous productivity gains in the future. The scope of productivity should be expanded beyond its traditional measurement/definition by focusing on continuing sustainability, which requires inclusiveness and integration of multiple technoeconomic factors as well as achieving greater efficiency. Productivity improvement must obviously be maintained to sustain economic growth. In today's rapidly changing global environment, innovation or quality improvement that does not anticipate the future may only yield limited, short-lived benefits.

Program coverage: National competitiveness and sustainable productivity; Determinants of productivity; Quality of institutions and productivity; Productivity measurement, technology, and productivity; Innovation, productivity, and employment; Factors affecting productivity performance; Globalization, technology, and productivity; Human capital development; and Government action to sustain productivity growth.

Development of Long-term Productivity Measures

The APO views productivity improvement as a forward-looking concept. The outlook for productivity gains continuing in the future is equally as important as how productive an economy is at a specific point. The scope of productivity measurement should therefore be expanded to include the sustainability dimension. Furthermore, in a fast-changing global environment, innovation or quality improvement that does not look toward the future may only have limited, short-term benefits. The disruptive nature of technological progress shows that it is necessary to integrate the external context and economic dynamics into internal innovative processes so that future-proof innovation can meet long-term needs and expectations.

The APO launched a research project to gauge factors contributing to long-term productivity growth. It involves a collaborative platform of four researchers working in related fields. The project was initiated in December 2019, and plans are to publish the results by August 2020.

Project coverage: Measurement/index of long-term productivity measures (LPM); Institutional measures of LPM; Energy productivity; and Establishing national LPM indexes.

Developing Improved Statistics and Methods for Sustainable Productivity

The unprecedented rate of technological progress, mostly attributed to the IT revolution, has brought new challenges in measuring economic production and its efficiency. The digital era has already resulted in a significant increase in the variety and quality of products and services coupled with decreases in their prices. Digital products and services together with digitalization of currently nondigital ones will likely lead to productivity and efficiency gains.

Existing economic and productivity measurement methods, however, do not adequately account for the gains from digital services. A significant portion of the benefits of free digital services/products such as search engines, real-time traffic apps, instant messaging, etc. is not accounted for in productivity measurement. This is a typical "productivity paradox" implying that existing measurement approaches may not be measuring correctly. While representing clear values to consumers and occupying an increasing share of consumption, the exclusion of digital products and services from the standard GDP accounting may mask information on real economic activity and performance since GDP growth is reported as slow while consumer welfare increases.

In an attempt to overcome these challenges, the APO in collaboration with the OECD started a research project to improve the statistics and methods to capture productivity dynamics viewed from a long-term perspective.

Project coverage: Labor and capital input measurement; Multifactor productivity (MFP) sensitivity testing; Drivers of MFP and factors affecting its sustainability; Exploratory regression analysis of MFP; and Inclusion of intellectual property assets, globalization, institutions, and business structure in MFP.

APO Productivity Databook and Database (2019 edition)

The 2019 edition of the *APO Productivity Databook* was published as an ongoing effort to support member governments in coping more effectively with current challenges while helping them to make timely policy responses to the changing situation and maintain their growth trajectories. As an annual analytical report on recent and long-term productivity and economic performance in the Asia-Pacific, the *APO Productivity Databook 2019* detailed the diverse stages and pace of economic development of member countries as well as reference economies. Productivity measurement based on official data enables relevant comparisons of the quality of economic growth and productivity gains achieved.

For the second year, mid-term projections of future economic growth and labor productivity in the Asia-Pacific through 2030 were developed to assist in setting updated target levels. Highlights of the analyses were newly included in each chapter, making it easier for policymakers to use the publication. Other innovative elements of the 2019 edition include 20 country profiles and five regional profiles with productivity indicators for APO members and other economies in the Asia-Pacific. Moreover, the total factor productivity (TFP) estimates in this edition were improved based on considerations of land capital and labor quality changes. TFP estimates were expanded to cover a wider range of economies. The Asian Economy and Productivity Map (AEPM) was also fine-tuned for greater user-friendliness with updated data releases. The project was carried out under a research partnership between the APO and Keio University in Tokyo, together with national experts who collect basic primary data following the internationally harmonized methodology.

Program coverage: Comparative analyses of labor productivity and sources of economic growth; Mid-term projections of future economic growth; TFP analysis; *APO Productivity Databook 2019*; APO Productivity Database (PDB); and AEPM.

APO Productivity Databook and Database (2020 edition)

Monitoring productivity trends and analyzing socioeconomic performance indicators for assessing potential growth are mandates of the APO as the sole organization in the Asia-Pacific devoted to productivity. The APO conducts annual research projects on productivity measurement and developed a comprehensive productivity database. The *APO Productivity Databook* presents detailed analytical reports on recent and long-term productivity and economic performance in the Asia-Pacific and reference economies. Sets of productivity indicators, measures, and data under an internationally harmonized measurement framework are included.

Preparations for the 2020 editions of the *APO Productivity Databook* and PDB got underway in 2019. Moreover, to provide greater support to member countries in setting policies and realistic targets, the *APO Productivity Outlook*, a detailed forecast of productivity growth, will be developed in 2020. Based on planning undertaken in 2019, the publication will detail future projections of the productivity performance of APO member countries at aggregate, sectoral, and key industry levels, along with policy implications, and an accompanying database covering major productivity indicators will be published.

Program coverage: Comparative analyses of labor productivity and sources of economic growth; Forecasting Asian economic growth and productivity indicators; Total factor productivity analysis; *APO Productivity Databook*; APO PDB; and *APO Productivity Outlook*.

Research on Reskilling Workers to Enhance Labor Productivity

Despite their potential for improving efficiency and productivity, new technologies can have negative effects, such as job losses for workers whose skills do not match changing requirements. Such structural unemployment is a concern for policymakers. Its mitigation takes concerted efforts by multiple actors in the labor market, including individuals, employers, and governments. An inclusive national reskilling strategy, ensuring that workers have opportunities to either broaden or deepen their existing sets of skills to match those demanded in the emerging labor market, is critical for easing structural adjustments. A national reskilling strategy must also be dynamic so that it can be easily adjusted to accommodate changing labor and training needs.

The APO launched a research project on Reskilling Workers for Enhancing Labor Productivity at a coordination meeting organized in collaboration with the NPO of Indonesia, 4–6 December in Jakarta. Five national experts from India, Indonesia, Malaysia, the Philippines, and Thailand, guided by chief experts from Australia and the ROK, are participating in the research. The meeting agreed that the final draft report would be delivered by September 2020. The objectives are identifying sustainable, inclusive models of reskilling and upskilling the existing workforce in APO members, including groups at risk of missing out on such opportunities. The research report will document innovative models of reskilling and upskilling for improving productivity while protecting livelihoods in APO member countries. Recommendations on how those models could be applied in different employment contexts will be incorporated in the publication.

Project coverage: In-depth country/case studies on labor reskilling; National reskilling strategies; Proposals for reskilling models; and Policy recommendations on reskilling based on country case studies.

CENTERS OF EXCELLENCE

COE on Smart Manufacturing

The CPC was appointed by the APO Governing Body in April 2019 as the APO Center of Excellence on Smart Manufacturing (COE on SM). Its main objective is to support member countries in adopting smart manufacturing in key industries. Various activities have been conducted since the inauguration of the COE on SM, allowing other APO members to benefit from its manufacturing expertise.

Expert Panel Meeting to Assess the Proposal for a COE on Smart Manufacturing

In an effort to assess the areas of excellence of NPOs or partner organizations in member countries to identify the next COE, ongoing discussions are conducted. A proposal for a COE on SM was received from the CPC of the ROC in 2019. Subsequently, the Secretariat convened an Expert Panel Meeting via Skype on 30 January 2019 to assess that proposal and make recommendations to the APO Governing Body based on its evaluation.

The Skype meeting was conducted among five members consisting of selected NPO Heads and one technical expert. The panel of experts endorsed the CPC's proposal on the condition that revisions would be made based on the requests of the panel. The Secretariat received the revised proposal from the CPC and circulated it to the panel for a second review. The revisions were approved, and the expert panel unanimously endorsed the application for the COE on SM. The CPC was approved as the APO COE on SM at the 61st session of the APO Governing Body in Manila, the Philippines, in April 2019.

Program coverage: COE proposal; Expert panel meeting; COE on SM.

Deputation of Experts to APO Member Countries

During 2019, the APO Secretariat assigned experts from the COE on SM to undertake missions to enhance knowledge and exchange best practices on the topic. Three experts visited different government organizations in Vietnam (July) and Thailand (November) to discuss policy measures facilitating smart manufacturing. Visits were also made to enterprises in those two countries to present methods for conducting smart manufacturing maturity measurements for productivity gains. Specifically, the Smart Manufacturing Experience demonstration site and CPC MES+ system to assess the smart manufacturing-readiness levels of enterprises were introduced. Comprehensive reports detailing future activities to promote consultancy services and technology cooperation with Vietnam and Thailand were submitted by the experts after the missions.

Program coverage: COE on SM; Technology cooperation; Consultancy service; Smart Manufacturing Experience demonstration site; CPC MES+ system; Maturity measurement; Productivity gains through smart manufacturing; and Manufacturing innovation.

International Forum on Smart Manufacturing and Launch Ceremony for the APO Center of Excellence on Smart Manufacturing

The 61st session of the APO Governing Body held in Manila, the Philippines, in April 2019 approved a proposal from the CPC to establish an APO COE on SM. The COE was launched in conjunction with the International Forum on Smart Manufacturing in Taichung on 6 August.

At the launch ceremony, a certificate and plaque acknowledging the founding of the COE on SM were presented to CPC Chairperson Sheng-Hsiung Hsu. The COE on SM is designed to work in close collaboration with APO member economies and leverage the technologies, services, and experiences of the ROC to support digital upgrading in the Asia-Pacific region. APO members will be given assistance in adapting to technology-driven changes in global manufacturing and Industry 4.0. Minister of Economic Affairs of the ROC Jong Chin Shen, Deputy Mayor of Taichung Bruce J.D. Linghu, international forum attendees, and more than 100 local participants were present at the launch of the APO's newest COE.

Program coverage: COE on SM; COE launch; Digital upgrading; Technology-driven changes; Global manufacturing; Industry 4.0; and Manufacturing innovation.

Assessment of Smart Manufacturing and Needs of Member Countries

A research project to assess the extent of implementation and adoption of smart manufacturing in member countries and identify their needs related to it was initiated in 2019. The output of this research will help the COE and APO in designing and implementing smart manufacturing activities that are relevant and attuned to the needs of members. One chief expert from the ROC and five national experts from the ROC, India, Indonesia, Thailand, and Vietnam participated in the research. A coordination meeting of those experts was held 12–14 November in Taipei to determine the research framework and how smart manufacturing needs would be assessed in each participating APO member. After the national experts conclude in-country research and their drafts are reviewed by the chief expert, the final report is expected to be submitted in March 2020.

Program coverage: Smart manufacturing; COE on SM; Adoption and implementation of smart manufacturing; and smart manufacturing needs of APO member countries.

COE on Green Productivity

Since its establishment in 2013, the APO COE on Green Productivity (GP) has promoted the adoption of GP as an approach to achieve economic prosperity along with sustainable development.

Strengthening the Programs of the Center of Excellence on Green Productivity (ROC)

In 2019, efforts to strengthen the institutional capabilities of the COE on GP were made. To enhance knowledge and exchange best practices under the COE on GP, the APO assigned two experts to an Industrial Collaboration Summit in Green Technology held in Taipei, 16–19 October. The experts shared knowledge on green technologies in the Asia-Pacific to foster green growth and achieve sustainable development. Subsequently, to promote sustainable food systems, a focus of the COE on GP, a three-day International Conference on Green Consumption focusing on food miles and carbon footprint reduction was held in Taipei from 26 to 28 November. Three experts from Japan, North America, and the Netherlands shared reports on innovative technologies and best practices in handling food waste as well as promoting sustainable food systems. The expertise of the COE on GP on these topics was therefore enhanced.

On the other hand, the COE on GP utilized its pool of experts in the four priority areas of resource recycling, green energy, green factories, and ecoinnovation to strengthen the capabilities of member countries. APO members benefited through those services to enrich their knowledge, understanding, and application of GP tools, techniques, and methods. Two experts from the COE on GP were sent to the International E-waste Management Network Workshop, organized 28 November–4 December in Bangkok. Experts also visited various local government agencies and companies in Bangkok to conduct technical assessment of the market demand for waste management services. Policy exchanges and discussions on the 3Rs and waste management topics with different agencies were also held.

Program coverage: GP; Resource recycling; Green energy, green factories, and ecoinnovation; Green technologies; Green consumption and food waste; Sustainable food systems; and Carbon footprints.

Review of Emerging and Priority Needs on Green Productivity

Given the recent trends and developments in GP-related themes, particularly the application of advanced technologies, it is necessary to reidentify and reprioritize the areas, sectors, and institutions that require support from the COE on GP. A review will be conducted by the APO and COE on GP based on GP implementation and needs of member countries previously identified. In 2019, two experts were assigned to conduct the review, and recommendations on the types of initiatives that should be pursued in 2020 to advance the implementation and adoption of GP practices in member countries will be made by the end of February 2020. Activities that specifically strengthen the capacity for GP promotion will be prioritized.

Program coverage: GP; Resource recycling; Green energy, green factories, and ecoinnovation; Green technologies; Green consumption and food waste; Sustainable food systems; Carbon footprints; and Emerging and priority GP needs.

Research on Green Productivity for the Base of the Pyramid for Sustainable Development in APO Member Countries

Recent studies have indicated that base-of-the-pyramid (BoP) business activities by multinational and local companies could contribute to poverty reduction and sustainable development while generating profits in the long run. The other contention of this model is that low prices and easy access to products and services will help the poor increase both their productivity and purchasing power. To heighten awareness among organizations, companies, and individuals of the need for continuous improvement and innovative approaches, the COE on GP is undertaking this research to examine possible contributions and opportunities for BoP-targeted GP activities to improve the quality of life of the people at the BoP while underpinning sustainable development.

The Research on Green Productivity for the Base of the Pyramid for Sustainable Development in APO Member Countries was initiated in 2016. Six national experts from India, Indonesia,

Malaysia, the Philippines, Thailand, and Vietnam undertook the research. The objective was to explore how the BoP approach interacts with issues such as ecobusiness, renewable energy, recycling industries, ecoagriculture, etc. while serving the interests of the poor. The final report containing cases of business strategy under the BoP model was finalized and the report was completed in 2019.

Program coverage: Defining the BoP as a business strategy within the framework of sustainable development; The BoP promise: Building businesses with impact and scale and its implications for sustainable development; and Examples of business strategies under the BoP model.

COE on Industry 4.0

The 59th APO Governing Body Meeting in Tehran, IR Iran, in April 2017 approved the establishment of the APO COE on IT for Industry 4.0 under the auspices of the NPC, India. Various activities have since been undertaken by the COE on IT for Industry 4.0 to share its expertise with other APO members.

Establishment of an Expert Database on IT for Industry 4.0

To reinforce its position as a knowledge center on IT and its applications for Industry 4.0, a directory of national experts in the field was developed in 2018 by the COE. The database was expanded internationally in 2019. An expert was assigned to design the database structure divided into various domains of IT for Industry 4.0 and then oversee the input of contents. Completed in November 2019, this systematic database offers member countries access to directories of individual experts and institutions on Industry 4.0 across sectors. A meeting to finalize the integration of the database into the COE web portal, as well as launching the database, is scheduled for February 2020.

Program coverage: Database; IT for Industry 4.0; Domains of IT for Industry 4.0; and COE web portal.

Development of Demonstration Companies on IT for Industry 4.0

The Fourth Industrial Revolution (Industry 4.0), characterized by increasing digitization and connected automation systems, has provided a leapfrogging opportunity in parallel with numerous challenges for SMEs. It is imperative for SMEs to move toward digitization and leverage related technologies to unlock opportunities for exponential growth and stay competitive in global value chains.

The APO COE on IT for Industry 4.0 set up in 2017 under the NPC, India, will lead the development of demonstration companies on IT for Industry 4.0 in SMEs. This is also part of the COE's efforts to develop and share expertise with other APO member countries, while strengthening its position as a knowledge center on IT and its applications for the Industry 4.0 transformation. The SME demonstration companies involved are supported in applying and utilizing IT solutions for the successful application of Industry 4.0 technologies in organizational processes while improving their productivity performance. The capacity for utilizing data, digitization, and the Industrial Internet of Things to raise manufacturing quality while simultaneously reducing costs will be enhanced. The processes and results of this project will be disseminated to other organizations by the COE to achieve multiplier effects among SMEs.

Five demonstration companies were selected and supported by the APO and NPC in 2019. One expert was assigned to assess the current status of maturity, design the framework, and guide the demonstration SMEs in improving their processes with the utilization of IT solutions to enhance productivity. The first expert visits were made in November 2019. Other visits are scheduled in 2020 to follow up on the progress made by the demonstration companies.

Research Mission on IT for Industry 4.0

To scale up the expertise of the COE at the benchmarking level against top-notch institutes in the area of IT for Industry 4.0, a research mission under the COE umbrella was organized 9–14

December in Seoul, ROK. Six participants from the COE on IT for Industry 4.0 visited various advanced manufacturing firms in the Korean Silicon Valley to observe successful IT-enabled services in connected industries. The national plan for Industry 4.0 was shared through visits to policy institutes on industry and innovation. This mission also facilitated the expansion of networks and partnerships with experts, enterprises, and institutions in the ROK. This is part of efforts to strengthen the COE's position as a knowledge center on IT and its applications for Industry 4.0. Ultimately, the strengthened COE will in turn assist other APO member countries in building up their capacity and expertise, improving the productivity of various organizations, etc.

Program coverage: The Fourth Industrial Revolution (Industry 4.0); COE on IT for Industry 4.0; Korean Silicon Valley; Advanced manufacturing solutions; IT-enabled serves in connected industries; Policy on industry and innovation; and National plan for Industry 4.0.

Research on Industry 4.0 Digitization Strategies for SMEs

Industry 4.0, the rapid technological revolution driven by new-generation technologies, has fundamentally transformed the future of production systems. The integration of manufacturing with state-of-the-art ICT linked to logistics processes among different companies is the key concept behind Industry 4.0. In APO economies, SMEs are on a fast-growth trajectory, but only a small fraction of them have access to the type of ICT that is commonplace in larger enterprises. There are numerous barriers to overcome before SMEs can fully embrace Industry 4.0. Such barriers include a lack of digitization knowledge, the high learning curve involved, difficulty in defining the starting point, etc.

Under the APO COE on IT for Industry 4.0 hosted by the NPC, research on Industry 4.0 Digitization Strategies for SMEs was initiated to support SMEs in member countries in moving toward digitization and staying competitive in global value chains as the Fourth Industrial Revolution proceeds. A chief expert from Germany and five national experts from the ROC, India, Indonesia, Malaysia, and Vietnam were selected to undertake this research. A coordination meeting among all experts, the NPC, and APO Secretariat took place 13–15 December in New Delhi to define the scope and methodology of the project, including data collection, data analysis, and timeline. They also designed a set of questionnaires to assess the current level of digitization and the critical needs of SME to achieve it. In December 2019, a report emphasizing that greater awareness of the benefits of Industry 4.0 digitization among all stakeholders and improved access to the Internet, advanced technologies, and funding for digitization initiatives among SMEs are the critical needs of SMEs was published.

Program coverage: APO COE Program; Industry 4.0; SME digitization strategies; Digital innovation; Digital ecosystems; and Smart processes.

Evaluation of the Performance of the APO COE

During the 60th session of the APO Governing Body in Vientiane, Lao PDR, in May 2018, APO Directors confirmed that the COE initiative was effective and should be continued. The first three COE were recognized as having supported the APO in capacity building and dissemination of knowledge and best practices in their respective fields to other member countries. APO Directors also emphasized that the critical success factors for the COE setup should include annual performance monitoring and evaluation (M&E) for all existing and future COE.

In 2018, the M&E framework including the evaluation criteria was developed by an external expert and finalized in 2019. In 2019, the evaluation of the performance of the APO COE was conducted. The prime purpose is to assess how COE have implemented their planned activities to strengthen their capabilities and benefited participants and/or organizations in member countries. The expert evaluation of COE performance will also make recommendations on the institutionalization of the performance evaluation process as well as refinement of the evaluation criteria and M&E framework to assess annual performance. Other achievements and next steps to achieve the intended results more effectively in the future are also expected from the COE performance evaluation report. One expert was assigned to start the evaluation in October 2019. The report was expected to be finished by March 2020.

Program coverage: COE M&E systems; M&E framework; Evaluation criteria; and evaluation of the performance of the COE.

Development of a Toolkit on Industry 4.0 for SMEs

Industry 4.0 has grown to encompass diverse business operations. However, there is no ready-made, one-size-fits-all strategy for implementing Industry 4.0 in every company. SMEs struggle to create their own methods to maximize the potential of Industry 4.0. Under the APO COE on IT for Industry 4.0, efforts were made to enhance the capability of the COE in scaling up the adoption of IT for Industry 4.0 technologies in SMEs.

A toolkit guiding SMEs to identify their own definitions of and approaches to Industry 4.0 and supporting them in adopting new, often disruptive business models was developed in 2019. It covers the fundamentals of Industry 4.0 and its implications for SMEs. More specifically, different tools and techniques, methods, a maturity index, and sets of technologies for the Industry 4.0 transformation of SMEs are introduced in a single useful package. Utilizing the toolkit, SMEs will be able to position themselves in terms of readiness and maturity level, thereby determining focus areas and prioritizing digital initiatives to accelerate their transformation. The toolkit will be published in February 2020.

Program coverage: Industry 4.0; SME toolkit on IT for Industry 4.0; Fundamentals of Industry 4.0; Techniques, methods, and technologies for the Industry 4.0 transformation; and Readiness and maturity levels of SMEs.

COE on Business Excellence

The business excellence (BE) framework is a management philosophy based upon quality management principles and tools with the goal of improving an organization's performance and meeting and surpassing stakeholders' needs. In 2019, efforts to assist the strengthening of BE initiatives continued.

Strengthening the Capabilities of the COE on BE

To enhance the capabilities of the pool of assessors under the COE on BE, a resource person from the USA was assigned to facilitate a three-day seminar from 13 to 15 November in Singapore. The seminar sharpened the skills of BE assessors and oriented them in a new BE management perspective through presentations and case studies on effective BE assessment, leadership, and the Baldrige Excellence Framework model. Forty BE assessors of Enterprise Singapore were also guided throughout the discussion sessions to strengthen their competencies and elevate their level of understanding of best practices. The knowledge is expected to be emulated by other BE assessors, consultants, and practitioners in APO member countries.

Program coverage: Effective BE assessment; BE assessment process; Stakeholder analysis; Baldrige Excellence Framework; Assessor know-how; Role of organizational system thinking and self-analysis in driving BE; Singapore BE framework; Good stakeholder analysis; and BE initiatives.

Review of Priority Needs on BE

The BE framework is a philosophy based on quality management principles to upgrade organizational performance while meeting or exceeding stakeholders' needs. In 2009, the 51st session of the APO Governing Body designated Enterprise Singapore (then known as SPRING Singapore) as the first APO COE focusing on BE. Since then, the COE on BE has shared its best practices among APO member economies while strengthening its leadership in BE in the region.

APO member countries have been supported by the COE on BE in building up capacity and expertise on BE, enhancing their capabilities in managing BE initiatives, developing and strengthening quality award systems, improving the productivity of various organizations, etc. In 2019, the APO assigned one expert to review the needs of member countries to extend better assistance in enhancing BE capabilities starting in 2020. The final report will be submitted to the APO Secretariat in mid-March 2020.

Program coverage: BE framework; BE initiatives; Need review; Capacity building; and BE best practices.

Development of Monitoring and Evaluation Systems for the APO COE

During the 60th session of the APO Governing Body in Vientiane, Lao PDR, in May 2018, it was emphasized by APO Directors that the critical success factors for the COE setup should include annual performance M&E for all existing and future COE. In order to adopt a longer-term approach in supporting the COE beyond the initial two years and to institutionalize procedures for the annual performance assessment, an M&E system should also ideally be in place for each COE. The M&E systems will allow the APO to better evaluate and align COE activities and programs with the common goals of the APO Vision 2020.

The development of the M&E framework with relevant evaluation criteria and other elements began with the assignment of an expert. The final M&E framework was commented on by the four COE and adopted in February 2019. The framework serves as the starting point to conduct the evaluation of each COE by an external expert.

Program coverage: COE M&E systems; M&E framework; Evaluation criteria; COE institutionalization of procedures; and COE annual performance assessment.

Program Development Fund

The Program Development Fund (PDF) was created to support activities not covered by other projects in the annual program plan aimed at meeting the needs and expectations of member countries. Previous projects funded by the PDF included the APO–Accenture Business Model Transformation Consultancy Project as well the Data Skills Program facilitated by the Future Moves Group. In 2019, projects under the PDF focused on: helping member countries achieve the goals of the APO Vision 2020; ensuring future-readiness; enhancing the strategy development, program planning, and policy advisory processes; and identifying inputs for the APO's biennial plan to develop the institutional capacity of NPOs.

In November, the first meeting of the Steering Committee for the Development of the APO Vision 2025 was held, as directed by the Governing Body at its 61st session in Manila in April. It was attended by eight APO Directors/Alternate Directors and led by the APO Chair. Additional steering committee and technical working group meetings are scheduled to develop the details of the APO Vision 2025 after consultation and feedback from member countries.

Another activity under the PDF was examining available methods to improve how surveys are conducted to monitor and evaluate APO projects. It was decided to adopt the well-known software program Qualtrics for use from 2020.

Program coverage: Formulating the APO Vision 2025 and its accompanying strategies; and Identifying appropriate data collection and entry software for more effective M&E of APO projects.

Research on Knowledge Management with the Concept of Sustainable Productivity

Knowledge capital should be institutionalized and managed so that it leads to more innovation. Combining the innovation resulting from knowledge capital management with agility will lay a firm foundation for productivity growth in the long run. Agility in responding to changes and taking advantage of opportunities they present should be an integral part of the equation for achieving productivity and prosperity. Productivity without agility will yield limited contributions to economic progress since it is only related to the notion of "doing the right things right" without considering risks and potential stemming from the turbulent, uncertain, complex environment. This has even broader ramifications for economic progress with the inclusion of innovation in the productivity concept. Agility augments and accelerates the contributions of productivity to economic growth, while strengthening the connection between productivity and innovation. Appropriate management of the knowledge accumulated through innovation and agility will make responses sustainable.

An APO research project on Knowledge Management with the Concept of Sustainable Productivity was initiated in 2019. It was designed to present practitioners with practical information for enhancing productivity, first at the macro and then at the micro level, by taking into account the factors of agility in the face of change, the need for constant innovation, and new forms of knowledge technologies. It is expected to be completed by March 2020.

Program coverage: Sustainable productivity; Foresight planning and agility; Continuous innovation; APO framework for knowledge management; Management of knowledge capital; Management of knowledge technologies; and Transformation through sustainable productivity.

Accreditation and Certification Process: Authentication of APO Certificates Using Blockchain Technology

Under the PDF and as part of the accreditation and certification process, the Secretariat successfully issued digital tamper-proof certificates on the Ethereum public blockchain. This technology allows secure authentication of all professional certificates issued by the APO Office of the Accreditation Body. It also stores and verifies APO data so that certification records, attendance records, and other transactions are in tamper-proof, open-source format. The pilot project supported current and future APO accreditation of certification bodies as well as certification of professional productivity practitioners and specialists in GP, public-sector productivity, and foresight. The results of the pilot project will be disseminated among NPOs to illustrate how data integrity can be maintained through blockchain technologies. Further training in the use of blockchain technologies will be conducted in phases starting from May 2020.

Program coverage: Industry 4.0; disruptive technologies; blockchain solutions; and authentication of APO certificates using a decentralized consensus algorithm.

ACCREDITATION BODY

Training of Trainers and Consultants in Green Productivity

The Green Productivity (GP) concept was developed by the APO and has been promoted for almost two decades as a strategy that leads to gains in profitability through improvements in productivity and environmental performance. The core of the GP methodology is the reevaluation of both production processes and products to reduce their environmental impacts while improving quality and overall productivity. It aims to contribute to continuous productivity growth as well as a sustainable environment.

To raise awareness of the need for sustainability and spread GP practices and strategies, the APO joined forces with the CPC to organize a Training of Trainers and Consultants in Green Productivity in Taipei, 10–21 June. Twenty-one participants from 13 APO members attended the course, along with resource persons from the ROC, Malaysia, and Singapore who offered extensive coaching in GP methodologies, tools, and techniques as well as practical consultancy applicable to manufacturing companies. The training course also aimed to develop APO-certified GP specialists who can support others in their national sustainable development efforts.

Program coverage: Sustainable development and corporate social responsibility; The APO Center of Excellence on GP; GP methodology and steps; Carbon footprint management; The circular economy: Overview, business models, technologies, and good practices; GP tools: Ecomapping, material balance, material flow cost accounting, and root cause analysis; GP techniques; Case studies; and Management consulting methodologies and skills. Participants undertook practical GP diagnoses in Hop Lion Feather Works Corp. and ChenFull International Co., Ltd. and then presented their results and suggestions for improvement to the management teams.

Workshop on Advanced Strategic Management for Enhancing Productivity

The digital revolution and technological change are having profound impacts on management thinking and practices in various economies. Industry 4.0 applications are expected to intensify in production operations and significantly reduce human labor in highly automated smart environments. Recognizing the importance of a new approach to strategic, long-term development planning, the APO is implementing a series of capacity-building courses on scenario planning and strategic foresight. A strategic foresight process requires constant external environmental scanning and information analysis to create plausible futures, the development of scenarios to test strategic thinking, and proposals of strategies for execution. Advanced strategic management incorporates strategic foresight, strategy formulation, strategic planning, implementation, and ongoing review.

A workshop on Advanced Strategic Management for Enhancing Productivity was organized by the APO in conjunction with NTPC in Nadi, Fiji, 12–16 August, to show how to develop foresight capability-centric scenarios and future thinking-oriented strategic management plans for enhancing productivity in the public and private sectors. Twenty-four government officers and professionals from NPOs and private consulting firms who promote advanced strategic management for the public and private sectors attended, representing 14 APO members.

Program coverage: Understanding strategic foresight and its usage in the policymaking process; Horizon scanning: Skills for sense-making and anticipating future trends; Scenario-building; Establishing skills for visioning future consequences of disruptive technologies; Scenario presentations; Assessment and developing readiness for innovation: Steps for creating an innovation mindset at the policy level; Scaling models: Enabling innovation frameworks inside government departments; Consolidation: Establishing a national innovation framework; and The "killing trends" approach for targeted innovation.

Certified Productivity Practitioners' Course for NPOs

At the Governing Body Meeting in 2018, member countries reported that capability building on productivity and quality in the public and private sectors, training for NPO staff, sharing of know-how and best practices in productivity improvement methods, raising the productivity of SMEs, and increasing the number of national productivity experts were among the areas that required support from the APO. Developing trainers and consultants capable of leading productivity enhancement activities in each member country was viewed as particularly important.

The Certified Productivity Practitioners' Course for NPOs was developed by the APO to meet that need and as a prerequisite for the new Productivity Practitioners Certification Program. The modules and contents concentrate on practical sessions to enhance competency in core areas needed by productivity practitioners: training; consultancy; and promotion. The course also includes theoretical and practical knowledge of productivity improvement strategies at the organizational level. It was offered by the APO in cooperation with the DAP in Manila and Tagaytay City, 19–30 August. Seventeen participants from 13 APO members attended, who were either NPO professionals involved in training and consultancy or associate consultants assigned by NPOs.

Three resource speakers from Japan, Malaysia, and Singapore gave presentations and facilitated the course: Associate Tomoo Aoki, Global Management Center, JPC; Senior Manager Dr. Sugumaran Muniretnam, Strategic Planning & Corporate Communication, MPC; and Managing Director George Wong, IMC Certified Management Consultant, Hotlink Systems & Services Pte.

Program coverage: Productivity promotion plans and strategies; Designing and delivering productivity training sessions; Diagnosing productivity problems and recommending solutions; Demonstrating relevant interpersonal skills; and Recommending suitable productivity tools and techniques. After passing the overall competency assessment, successful participants are required to carry out productivity improvement projects in their countries and submit project reports six months after training course completion. Mentoring and coaching will guide participants in preparing the project reports, and successful candidates will receive three-year certification as APO productivity practitioners.

Development of Public-sector Productivity Specialists (APO Certified Public-sector Productivity Specialists)

To assist public managers in improving their own governments and individual public-sector organizations, a *Course Manual on Developing Productivity Specialists in the Public Sector through the Center of Excellence on Public-sector Productivity* was developed. It was envisioned that the manual would be utilized as a reference in conducting capacity-building initiatives and developing and certifying productivity specialists for the public sector in member economies. Recognizing the competence of individuals through certification in the field of public-sector productivity after they attend a face-to-face APO training course will promote brand awareness, cultivate a community of experts, and strengthen APO leadership in the field.

The APO organized a course on Development of Public-sector Productivity Specialists (APO Certified Public-sector Productivity Specialists), 22–26 July in 2019, in Bangkok, which was hosted by the FTPI. The objectives were to: train trainers in the concepts, approaches, tools, and techniques that will develop their competencies as productivity specialists in the public sector; develop the skill sets required for participants to become APO-certified public-sector specialists; and certify participants as trainers on public-sector productivity after the certification requirements are fulfilled. Three resource persons from the ROK, Malaysia, and the Philippines made presentations on various topics relating to public-sector productivity. The workshop was attended by 20 individuals from 15 member countries.

Program coverage: Tools for improving organizational productivity; Citizen-centered service; e-Government; Regulatory reform; Performance management; Measuring public-sector productivity; Leadership and change management; Developing a productivity improvement plan; and APO certification requirements and process. The participants visited the National Discovery Museum Institute to apply and enhance their learning and submitted individual action plans for the certification program.

APO Productivity Practitioners Certification Management System

The APO introduced a certification program in 2015 to increase its visibility as the leading international organization on productivity. By recognizing competent individuals in different fields of productivity, certification builds APO brand awareness, cultivates communities of experts, and strengthens leadership in specific areas. After the inception of the certification program for productivity and GP practitioners, a total of 40 individuals were certified by the APO. After reviewing the program structure, methodology, and scope, in 2019 the Secretariat began developing the APO Accreditation Program under which NPOs can be designated as certification bodies (CBs). It is expected that the numbers of certified persons will increase and the roles of NPOs be expanded from training providers to internationally accredited CBs. The Secretariat continues to provide support by developing the standard operating procedures (SOPs), requirements for CBs, and other details of certification schemes.

A technical working group (TWG) was appointed by the Secretariat to develop the requirements for CBs within NPOs. The TWG consists of experts in accreditation, representatives of NPOs, and members of government-designated national CBs, who discussed and drafted the SOPs including the rules and procedures for CBs, quality management system, certification agreement, standard features of APO certification schemes, and procedures for assessing CBs during 2019. The TWG was headed by the President of the Management System Certification Institute of Thailand and supported by members from the NPOs of the ROC and Vietnam, Indonesia Professional Certification Authority, International Accreditation of Japan, and Standard Malaysia.

APO Accreditation and Certification Development Program

Wider global recognition is imperative for the APO in its quest to be the leading international organization on productivity enhancement. Worldwide recognition will also pave the way for potential expansion of the membership, increase global demand for its services, strengthen its institutional capacity, and enhance stakeholders' confidence. An accreditation and certification

program was identified as one activity that could raise the APO's visibility and authority as a leading productivity organization. A program that includes recognition of NPOs or their affiliates as APO-accredited CBs will build APO brand awareness, strengthen its leadership in productivity, and boost the value of its services. This initiative will also expand the APO's role in developing the capacity of NPOs from training providers to becoming future-oriented productivity-related specialist accreditation bodies.

In 2019, the APO officially established the Accreditation Body (APO-AB) within the Secretariat. In line with international requirements for ABs, the Office of the Accreditation Body was set up in February to implement accreditation activities. The AB Council consists of the APO Secretary-General; NPO Heads; representatives from Fiji, Japan, Malaysia, Singapore, and Pakistan; and representatives of the Ministry of Economy, Trade and Industry of Japan, Japan International Cooperation Agency, Japan SME Management Consultant Association, Indonesia Professional Certification Authority, and Thailand Management System Certification Institute. The APO also published two certification schemes, APO-PS 101 Requirements for Productivity Specialists and APO-GPS 201 Certification Scheme and Competency Standard for Green Productivity Specialists. The schemes replaced the previous certification program launched by the APO in 2015. In addition, the APO 001/2019 Requirements for Certification Bodies Operating the APO Certification Scheme document was published. All documents are available on the APO website.

Program coverage: The APO CB accreditation process in member countries; Onsite and offsite assessment; Providing assistance to NPOs or affiliated organizations in complying with the standards and requirements for APO CBs; and Development of certification schemes including the content, certification requirements, and assessment methods.

Development of the Green Productivity Specialists Certification Scheme

The GP Specialists Certification Scheme was launched by the APO as a response to the demand by member countries for competent trainers and consultants in this field. The scheme launched in 2017 was based on the annual APO training course on GP hosted by the ROC. Similar to the certification program for productivity practitioners, the original GP certification course had low enrollment rates. Therefore, the Secretariat revised the certification process and methodology under the new APO-AB. A TWG, comprising representatives of NPOs and a GP technical and certification expert, was assigned to develop the APO GP Specialists Certification Scheme.

A TWG coordination meeting was held 25–27 June in Yogyakarta, Indonesia. The Chairperson of the Indonesia Professional Certification Authority presided, and TWG members included the Director, Research and Development, Competency Certification Institute, Indonesia; representatives of the CPC and NPO, Pakistan; and environmental consultants from India, Malaysia, and Norway. The first draft of the certification scheme was circulated to member countries for feedback in August. After consultations among the TWG Chair, members, and technical expert, the revised draft was circulated to all APO-AB Council members in October 2019 for further comments. The scheme was approved on 18 October under the title APO-GPS 201/APO 201 Certification Scheme and Competency Standard for Green Productivity Specialists. The APO will act as the scheme owner, while accredited organizations in member countries will implement the scheme as CBs. The document is available on the APO website for easy reference.

Program coverage: The APO GP Specialists Certification Scheme; Scheme standards, competency framework, and conformity assessment process; Scope of certification; Job and task descriptions; Required competence and prerequisites for certification; Code of conduct; and Certification process requirements, recertification, assessment methods, and criteria for suspending certification.

Development of Accreditation Standard Operating Procedures

The newly established APO-AB is committed to operating its programs and related services in compliance with international standards to meet the needs and expectations of member

governments. To ensure that its operation and management systems meet those standards, the APO-AB complies with the international standard on Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies (ISO/IEC 17011:2017). The Secretariat formed a TWG to assist in developing the quality management system of the APO-AB and specify the system requirements for competence, consistency of operations, and impartiality in its assessment activities and accreditation of CBs.

The first coordination meeting of the TWG was held 11–13 March in Kuala Lumpur, Malaysia, presided over by the President of the Management System Certification Institute of Thailand. The meeting was attended by members of the NPOs of the ROC and Vietnam, Indonesia Professional Certification Authority, International Accreditation of Japan, and Standard Malaysia. The TWG was able to finalize the APO-AB documentation and SOPs.

Program coverage: SOPs for the APO-AB; Internal activities and procedures of the APO-AB; Procedures for the assessment of CBs; General requirements of certification schemes; Competency requirements of resources involved; APO-AB Quality Manual; Terms of reference for the TWG; Terms and conditions governing the use of the APO-AB accreditation logo/mark by CBs; and Process/procedures for the accreditation of CBs.

Development of the Productivity Specialists Certification Scheme

In 2015, the APO launched a pilot certification program by choosing the multicountry Development of Productivity Practitioners (DPP: Basic and Advanced) projects as prerequisite training courses. However, only a handful of participants fulfilled all the requirements and were certified as productivity practitioners. After the establishment of the APO-AB, the Secretariat decided to revise all certification schemes for productivity practitioners. This will ensure that they are aligned with international standards of practice and enhance the APO's visibility as a leading international organization on productivity. The APO will serve as the scheme owner, while accredited NPOs will implement the scheme as CBs.

A TWG was set up to develop the APO Productivity Specialists Certification Scheme. The first TWG meeting was held 23–25 April in Kuala Lumpur, Malaysia, and chaired by the Director General of the MPC. The members included representatives of the NPOs of India, Japan, Malaysia, and the Philippines as well as technical experts from Japan and Singapore. The first draft of the scheme was released in May for feedback from member countries. After analyzing their comments, the TWG convened a second meeting, 29–31 July, also in Kuala Lumpur. The final draft was then circulated to APO-AB Council members on 29 August for further feedback. Finally, the scheme was approved as the APO 101 Requirements for Productivity Specialists to guide CBs in certifying productivity specialists in member countries. The document is available on the APO website for reference.

Program coverage: The APO Productivity Specialists Certification Scheme standards, competency framework, and conformity assessment process; Scope of certification; Job and task descriptions; Required competence and prerequisites; Code of conduct; Certification process requirements, recertification, and criteria for suspending certification; and Assessment methods.

Development of the Public-sector Productivity Specialists Certification Scheme

The APO Public-sector Productivity Framework was launched to address the growing need of member countries to improve the organizational performance and productivity of their public institutions. The framework also serves as a reference for improving the quality of public services. To ensure that public-sector productivity initiatives and programs are coordinated systematically in member countries, the APO established the COE on Public-sector Productivity within the DAP. In 2016, the COE on Public-sector Productivity created a course manual on *Developing Productivity Specialists in the Public Sector* as a reference for member countries. After the establishment of the APO-AB, it assigned a TWG to develop the standards and requirements for public-sector productivity specialists certified by the APO.

The TWG, headed by the President of the DAP, consists of experts from the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration of Indonesia, National Institute of Public Administration of Indonesia, Korea Institute of Public Administration, Integrated Management System of Malaysia, and Sri Lanka Transportation Board. A coordination meeting was held 10–12 September in Manila. The scheme will be known as APO PSPS 301: Public-sector Productivity Specialists Certification Scheme. Those certified will be categorized as specialists in e-government, performance management, innovation and change management, quality service delivery, and regulatory reform. The five specialized areas are based on the thematic areas in the APO Public-sector Productivity Framework.

Program coverage: Development of the APO Public-sector Productivity Specialists Certification Scheme; Standards, requirements, and competency framework for public-sector productivity specialists; and Conformity assessment process for public-sector productivity specialists.

Development of the Future-readiness Award Program

The APO introduced a future-oriented strategic planning approach that incorporates foresight management to help organizations in member countries become future-ready. A series of workshops and courses has been conducted to increase organizational ability to devise long-term national strategic plans by relying on foresight management and scenario planning. To sustain these initiatives and as part of APO business continuity support for member countries, the Secretariat proposed the establishment of the Future Readiness Award (FRA) to recognize organizations that practice successful foresight management. It will also encourage organizations to be future-ready by pursuing innovative strategies, embracing new knowledge, and applying advanced technologies in enhancing their productivity and competitiveness.

A TWG was formed to assist the Secretariat in developing the FRA, which held its initial coordination meeting from 28 to 30 May in Bangkok. The group was headed by the Assistant Chief Executive Officer of Enterprise Singapore and members included representatives of the Finland Futures Platform, KPMG Services Pte. Ltd of Singapore, University of Stellenbosch of South Africa, Centre for Australian Foresight, and FTPI. An interim report on FRA development was produced, including: an overview of methodology and process; key findings from a literature review; the future-readiness framework: dimensions, elements, criteria, and indicators; FRA criteria; information for applicants; and recommendations on operating the award scheme.

Program coverage: Basic outline of the FRA; FRA framework; Assessment criteria for FRA applicants; Award process; Terms of reference under the FRA; and Methods for promoting the FRA in member countries.

APO-AB Council Meeting

The APO-AB was set up as an impartial entity within the Secretariat to provide recognition to organizations including NPOs as APO CBs. To ensure alignment with international requirements for accreditation bodies, the APO-AB has an organizational structure that includes a council and TWGs. The council serves as the highest authority that sets the vision, mission, and direction of the APO-AB. It is composed of a council head and representatives of NPOs, government officials, national CBs, and industry. The inaugural meeting was held in Tokyo in 2018, presided over by the APO Secretary-General.

The second annual meeting, held in Tokyo on 10 and 11 December 2019, discussed the current progress, issues, challenges, and future directions of APO-AB accreditation activities. The council also provided recommendations to the Secretariat on improving the management of the APO-AB and discussed the role of NPOs as CBs. The meeting was attended by council members, advisers and observers from the NPO of Indonesia, Indonesia Professional Certification Authority, and Ministry of Economy, Trade and Industry of Japan. Two new council members were appointed as replacements due to retirement and transfer. The meeting agreed to revise the rules and procedures for council members and discussed the requirements for CBs, the development of new certification schemes related to the service sector, the continuation of training courses focusing on productivity practitioners and GP, and the development of NPOs

as CBs. It was reported that six member countries, Indonesia, India, Malaysia, Mongolia, Pakistan, and Vietnam, would undertake CB development projects.

Program coverage: Rules and procedures of the APO-AB; Requirements for APO CBs; Progress of APO certification schemes; Progress of CB development by NPOs; and Development of the APO FRA.

Certification Body Development Program: Development Project for the Directorate of Productivity Development (NPO of Indonesia) as an APO Certification Body

The Certification Body Development (CBD) Program is the latest initiative by the APO aiming to expand the role of NPOs to become CBs operating APO certification schemes. This initiative should be considered as a continuation of other NPO-centric capacity-building programs such as Development of NPOs and in-country training courses. While previous programs focused on enhancing the competency of NPOs as training providers, the current one focuses on building up their capabilities through accreditation as CBs. It involves consultancy and training on the scope of accreditation, certification process, competency of staff, and management structure. It will ensure that recipient NPOs are able to meet the requirements and are fully prepared before assessment by the APO-AB.

The Secretariat invites interested NPOs to participate in this inaugural project by submitting official applications. Depending on their current structure and management system, selected NPOs participate in the CBD Program for four to six months. The first project started in the NPO of Indonesia in November 2019, with the goal of establishing the first APO CB for GP specialists.

The Directorate of Productivity Development, Ministry of Manpower, Republic of Indonesia, is responsible for formulating policy, compiling standards, and providing technical guidance on management, institutional development, and human resources development. Similar to other NPOs in member countries, the NPO of Indonesia is also involved in training and consultancy on productivity and quality management systems. Recently, the NPO has collaborated with the Indonesian National Qualification Framework and Indonesia Professional Certification Authority to develop a certification program in productivity-related areas. The certification program will be one of the key elements under the new human resources development agenda for 2020–2024.

The CBD Program for the NPO of Indonesia is meant to assist it in complying with the requirements for a CB operating the APO certification scheme on GP specialists. The program includes training and consultancy services to the Directorate of Productivity Development for establishing the structure, documentation, and procedures according to the APO requirements for a CB. Phase 1 of the CBD project was implemented from 18 to 22 November with the involvement of international and local experts and representatives of stakeholders. It is expected that the NPO of Indonesia will become the first CB on GP specialists in member countries.

Program coverage: ISO/IEC 17024:2012 Conformity Assessment—General Requirements for Bodies Operating Certification of Persons; APO-AB COP 001/2019 APO General Requirements for Certification Bodies: Certification of Persons Scheme; and APO-GPS 201/APO 201 Certification Scheme and Competency Standard for GP Specialists.

Development of the Strategic Foresight Certification Scheme

Based on feedback from early strategic foresight courses and workshops, there was a need for the APO to provide more in-depth knowledge and skills on that topic, ensuring that NPOs or related organizations would be able to assist their governments in developing national policy related to productivity. A certification program was identified as one solution. By certifying professionals based on the standards and requirements set by the APO, more national trainers and consultants on strategic foresight could be created. The roles of NPOs would also be enhanced by functioning as CBs.

A development project to establish the APO Strategic Foresight Specialists Certification Scheme was therefore undertaken. A TWG was formed with members from the Tokyo University of Technology, Malaysian Industry–Government Group for High Technology, DAP, National University of Singapore, Future Moves Group Pte. Ltd. of Singapore, Scenario Insight LLC of the USA, and Thinking Futures Australia. A TWG coordination meeting was held 11–13 November in Tokyo. The details of the scheme proposed by the TWG will guide the APO's capacity-building projects for foresight specialists.

Program coverage: Development of the APO Strategic Foresight Specialists Certification Scheme; Standards for certified foresight specialists; Competency framework for certified foresight specialists; and Conformity assessment process for certified foresight specialists.

DIGITAL LEARNING

Agriculture courses launched in 2019

Self-learning e-Course on Modern Food Storage and Transport Technologies

With an expanding middle class and increased per capita income, the demand for food is shifting from quantity to quality. The demand for fresh, safe food is increasing worldwide. Maintaining food freshness and safety adds value and reduces food losses. Efficient food value chains also contribute to increasing the income of each actor. As most agricultural products are perishable, their quality starts deteriorating immediately after harvest due to respiration, water loss, and insect pests and diseases. About 30% of the total food produced is lost due to poor postharvest infrastructure including storage and transport in developing countries. Therefore, maintaining quality throughout storage and transportation is vital to deliver fresh, healthy food to retail markets and consumers.

To train a critical mass of individuals, in particular managers and officers of enterprises in food supply chains including SMEs, officers of governments and NGOs, academics, extension officers, and consultants, the APO offered a self-learning e-course on Modern Food Storage and Transport Technologies, 1 August 2019–31 July 2020. As of 31 December 2019, a total of 102 participants from 21 countries, including seven from nonmembers, had enrolled in the course to acquire advanced knowledge of food storage and transportation. Four had completed the course and passed the final examination.

Program coverage: Overview of modern food storage and transport technologies; Characteristics of fresh produce; Important environmental factors affecting produce quality; Optimum storage conditions; Harvesting and precooling of produce; Packaging of produce; Transportation of produce; and Marketing of fresh produce.

Self-learning e-Course on Organic Inspection and Certification

Organic markets are expanding worldwide, mostly due to increasing consumer consciousness of health and fitness and concerns about the impact of input-intensive agriculture on natural resources, the environment, food quality, and overall sustainability of agriculture. Consumers are, however, also growing more concerned about the authenticity of the organic products they buy. Producers need to employ legitimate organic production processes to enhance consumers' trust in food labeled as organic. Other players in agrifood value chains also need to guarantee that an organic product is not contaminated with nonorganic material while it moves from farm to fork. This requires the establishment of a credible system of organic certification because only items produced, inspected, and certified in accordance with the prescribed standards and regulations can be traded and labeled as organic at premium prices. Certification can help protect both consumers and genuine organic producers alike from false claims and misleading labeling of products.

The APO launched a self-learning e-course on Organic Inspection and Certification, available online from 17 October 2019 to 16 October 2020. By 31 December 2019, a total of 109 participants had enrolled and 20 had qualified for certificates. The course is offered to enable

participants to understand the basic concepts and principles of organic certification and inspection along with salient organic standards and organic certification programs. It will promote direct linkages among rural farmers and agribusiness entrepreneurs and markets as organic certification enhances product quality, consumers' trust in the authenticity of organics, farm profitability, and the sustainability of food production systems.

Program coverage: Introduction to organic agriculture; Key concepts in organic agriculture, organic value propositions, salient facts about global organic agriculture, and challenges in organic farming and measures to resolve them; Basic concepts in organic certification and challenges and opportunities; Organic standards, certification, and labeling; Considerations before certification; Organic inspection; and Useful facts about organic certification and organic certificates.

Self-learning e-Course on Innovative Cost-effective Technologies for Sustainable Agriculture

Industry 4.0 technologies have led to a paradigm shift in agricultural efficiency. Recent precision agriculture encompasses such technological advances. Digitized management is at the core of precision farming for optimal use of agricultural inputs and enhanced production capacity. Newer agricultural technologies are able to offset input costs while improving productivity and food security. Considering the economic conditions of less developed countries, the use of affordable, accessible, simple technologies that utilize existing infrastructure and resources is on the rise in line with digital agriculture. For example, many reports cite mobile phones as efficient tools for information and knowledge sharing throughout agricultural supply chains. Sharing new production technologies such as improved seed varieties, nutrient management, and pest control methods can directly lead to productivity growth.

The APO Secretariat has offered a self-learning e-course on Innovative Cost-effective Technologies for Sustainable Agriculture open to participants from APO member/nonmember countries since October 2019. A US resource person developed the course materials to share recent innovations and trends in agricultural technologies and review how they could be adopted for long-term sustainable profitability. The course also aims to promote the benefits and applicability of digital agricultural innovations on a small scale in APO member countries, enhance sustainable agricultural productivity, and maximize supply chain value.

Program coverage: Introduction to sustainability and cost-effectiveness in agriculture; Hardware technologies for agricultural production and farm management; Crop and farm management software; Digital solutions for agricultural distribution and logistics; Technologies for climate-resilient agriculture; Scientific management of livestock and animal health technologies; Building local or national agritech ecosystems; and Knowledge sharing, pricing, and information management solutions.

Self-learning e-Course on Modern Food Distribution Systems

Food supply and distribution systems (FDS) generally involve three elements: transportation; warehousing; and retail facilities. Food is supplied to urban areas through transportation chains and then stored in warehouses for distribution. The distributed food is sent to retail markets and facilities to reach end-consumers. However, the systems are varied, complicated processes that may result in storage in multiple warehouses and transport to different distribution centers within a city. Therefore successful FDS may take various forms based on economic and social considerations. To establish successful FDS, integrated strategies are required in line with changes in external factors, infrastructure, facilities, and services to match city growth and rising urban food demand. Macro-level policies on related factors such as agriculture and regional and urban development must also be considered.

The APO Secretariat launched a self-learning e-course on Modern Food Distribution Systems open to individuals from APO member/nonmember countries in December 2019. Course modules were developed by an APO-assigned resource person from the UK to provide knowledge of the concepts, principles, characteristics, and trends in FDS. The course also aims to share various approaches and diversity in FDS and promote sustainable food distribution models that reflect economic and social considerations to support APO member countries.

Program coverage: Introduction to FDS; Consumer and food industry trends shaping FDS; Major stakeholders and their roles in FDS; Drivers and operators of local and global supply chains; Government and industry regulatory policies and programs affecting FDS; and Efficient FDS.

Self-learning e-Course on Innovations in Agroforestry Systems

Land degradation results in the reduced capacity of ecosystems to provide diverse social and environmental goods and services. This includes the loss of habitat for biodiversity, reduced soil and watershed productivity, altered microclimates, and diminished livelihood potential including food, nutritional, and financial insecurity. One way to rehabilitate land and sustain production is through agroforestry. Agroforestry is the collective term for land-use systems and technologies in which woody perennials (trees, shrubs, palms and bamboo, etc.) are used deliberately on the same land-management units as agricultural crops along with animals in some form of spatial arrangement or temporal sequence. Agroforestry enhances agricultural productivity, among other economic, social, and environmental benefits.

The APO launched a self-learning e-course on Innovations in Agroforestry Systems, available online from 23 December 2019 to 22 December 2020. During 2019, a total of five participants had enrolled. The course aims to show how agroforestry can be used to increase the productivity of degraded land and enrich participants' knowledge of agroforestry. It also demonstrates on how agroforestry can increase land productivity at the watershed level and will build the capacity of practitioners to adopt agroforestry in their land management practices.

Program coverage: Land degradation; History, definition, and criteria used to classify agroforestry practices; Agroforestry practices and choosing the right model; Agroforestry practices regulating and supporting ecosystem functions; Agroforestry practices and ecosystem functions with a focus on forest gardens; Agroforestry adoption and increasing its effectiveness; Applying innovative agroforestry practices for watershed rehabilitation: Case study of the rehabilitation of a degraded watershed in Sri Lanka; and What is needed to implement watershed rehabilitation.

Industry courses launched in 2019

Self-learning e-Course on Basic Data Analytics for the Public Sector

In recent years, we have seen the increased use of basic data analytics and how they revolutionize and revitalize not only businesses but also the public sector. They have played a vital, transformational role in improving the quality of public-sector decision- and policymaking, strengthening political accountability, and delivering reforms in terms of advancing public services, monitoring budgets, and cutting waste, among other ways to enhance efficiency and effectiveness. Government organizations can now operate in a more data-driven, information-led manner, which was not possible previously.

The APO offered a self-learning e-course on Basic Data Analytics for the Public Sector, 1 February 2019 to 31 January 2020. A total of 421 participants from 35 countries, including 27 from nonmembers, enrolled in the course during 2019 to gain knowledge of applications of data analytics to the sector. Thirty-one completed the course and passed the final examination. The objectives of this course were to provide a basic understanding of data analytics in the public sector, introduce key quantitative analysis methods and skills in understanding data analytics, improve problem-solving capacity through data analytics, and explain how to utilize data analytics for smarter management of organizations and for better public services.

Program coverage: Purpose and use of data analytics in the public sector; Fundamentals of data analytics in the public sector; Analysis and visualization of data using descriptive statistics, probability distributions, and linear regression and correlation; and Applications of data analytics.

Self-learning e-Course on Management Innovation in SMEs

Innovation is considered the main economic driver of the 21st century. The impact of innovation and its management has been widely discussed worldwide by economic researchers and productivity practitioners. It is also rapidly affecting APO member countries in all sectors and

aspects of people's lives as they face challenges in addressing the wide-ranging implications of the changing business environment.

A self-learning e-course on Management Innovation in SMEs was therefore designed to introduce the background, concept, and applications of innovation management and examples of their use in various economic sectors, especially from the viewpoint of SMEs. It is intended for managers of SMEs, NPO staff providing innovation consultancy for SMEs, and policymakers and regulators involved in innovation policy for SMEs. Enrollment opened on 27 December 2019 and the course will be available online until 31 December 2020. It will raise awareness of innovative strategies in different sectors and enhance the understanding and decision-making processes of participants in efforts to increase business performance and improve productivity in SMEs by showcasing cost-effective approaches to innovation management.

Program coverage: Concept of management innovation; Process of innovation; Barriers to innovation; Innovative strategy for SMEs; Open innovation for SMEs; Overview of emerging trends; and Case studies of sectoral innovation.

Self-learning e-course on Critical Strategic Foresight Tools for Sustainable Productivity

Increasing interconnection and complexity are distinctive features of today's world. Unprecedented rates of change, resulting in unparalleled levels of uncertainty, have made it difficult for decisionmakers and planners to develop robust strategies. Traditional models of planning which rely solely on linear extrapolations of current trends cannot consider "wild cards" or how certain factors interact in complex ways. Strategic foresight refers to an organization's capacity to think systematically about the future to inform decision making today. Strategic foresight can be developed by employing and institutionalizing tools such as scenario planning within the planning process. Through these tools, planners may anticipate opportunities and threats occurring in the near and distant future and develop appropriate, robust strategic responses to those possibilities.

To introduce a critical mass of individuals to the fundamentals of strategic foresight and scenario planning, the APO offered a self-learning e-course on Critical Strategic Foresight Tools for Sustainable Productivity. The course material was developed by the APO in partnership with Jonathan Star of Scenario Insight Ltd., an experienced scenarist. This course was launched in December 2019.

Program coverage: Principles of strategic foresight and scenario planning; Defining focus and developing framing questions; Horizon scanning; Creating scenario building blocks; Strategic storytelling; Identifying strategic options; Designing meetings; Communicating scenarios; and Practical applications.

Self-learning e-Course on Basic Smart Manufacturing 101 in a Blockchain-driven Era

Blockchain solutions are widely regarded as an exponential technology. The potential of blockchains across traditional industries has been widely discussed and is rapidly impacting APO member countries in all sectors and aspects of people's lives. All countries face challenges in addressing the wide-ranging implications of blockchains and prioritizing targets, resources, and policy measures for digital transformation. It is thus necessary to establish a holistic understanding of the blockchain concept and its attendant solutions and develop strategies in response to the opportunities and challenges of distributed ledger technology (DLT).

Aligned with the Transformation Program of the APO, this course aims to introduce the background, concept, and applications of blockchains and examples of their use in various economic sectors. The course will raise awareness of blockchain solutions across different sectors and enhance the understanding and decision-making processes of participants in efforts to increase business performance and improve productivity through new disruptive digital technologies.

Program coverage: Blockchain technology overview; Application scenarios for blockchains; and Industry 4.0 smart manufacturing and blockchain solutions.

Individual Program

SPECIFIC NATIONAL PROGRAM

Institutional Capability Development Plan for the National Productivity Organisation of Bangladesh

Despite continuous effort and diverse initiatives to enhance national productivity, the levels of development of NPOs vary. Some are advanced and undertaking a wide range of productivity-related activities, while a few have not been able to expand their services or scale up their activities due their organizational structures, mandates, objectives, and funding arrangements. Considering the social, political, and economic changes in APO member countries and emerging global developments and challenges faced, these have posed serious challenges to NPOs, including their effectiveness in and relevance to national productivity movements and the sustainability of operations in the long run.

The NPO of Bangladesh was the second to participate in the APO's Institutional Capability Development Program. The program offers assistance in formulating plans to enhance NPOs' capacity and roles in productivity promotion, training, and consultancy services for the public and private sectors while raising their visibility as leading productivity organizations. The project in Bangladesh started in November 2019 and was completed in January 2020. Two experts on organizational excellence from the ROK and New Zealand made two visits (11–18 November 2019 and 20–21 January 2020) to the country, when they conducted consultation meetings with approximately 20 national stakeholder representatives. The project involved five stages to address nine key areas.

Although the experts were in the process of drafting their recommendations for the institutional capability plan at the time of writing, they indicated that the NPO needed to undergo a major transformation to effectively lead the productivity movement and facilitate the implementation of the Bangladesh National Productivity Master Plan 2021–2031 to achieve upper middle-income country status by 2021 and developed-country status by 2041. One key aspect of that transformation was establishing a governance board for the NPO to ensure its abilities to lead the productivity movement, develop appropriate strategies, and use public funds wisely for maximum impact.

The final plan was to be released to the NPO of Bangladesh in April 2020.

Policy Consultancy on a Productivity-driven Growth Strategy in Bangladesh

Supported by an inclusive growth strategy, particularly through the empowerment of women and offering a better environment for manufacturing firms to grow and create more employment, Bangladesh has successfully transformed its economic structure since the 1980s, recording a strong growth performance of 5–6%. The recent achievement of middle-income status by Bangladesh is one of Asia's most remarkable success stories. While the recent high growth has resulted in declining poverty, flourishing employment opportunities, and better access to healthcare, education, and basic infrastructure, a new strategy is required to achieve the country's goals of becoming an upper middle-income country by 2021 and then to achieve high-income status by 2041 supported by an even stronger annual growth rate of at least 7.5–8%.

The Bangladesh National Productivity Master Plan FY2021–FY2030 that was developed with the assistance of the APO from April to June 2019 is intended to serve as a comprehensive guide to execute the high-productivity growth strategy. With a 10-year time frame, it will steer the implementation of programs to raise Bangladesh's productivity performance substantially. The strategy is underpinned by a holistic approach to managing all the drivers affecting national

productivity, augmented by the country's agility in acting upon future trends that impact them and quickly seizing opportunities for growth.

In achieving the objectives of a productivity-driven growth strategy, the master plan is supported by five macro goals: a broad base of productive enterprises led by a vanguard of innovative, agile enterprises; leading-edge sectors producing high value-added goods and services; a complex economic structure characterized by the production of sophisticated products; a robust business environment; and the existence of advanced macro enablers.

Policy Consultancy on Innovation-driven Productivity Improvement for Fiji

Since its independence in 1970, Fiji has trebled its GDP, with an average growth of 2.6% a year. This has enabled a near doubling of the country's GDP per capita and progression into the ranks of upper middle-income countries. Nevertheless, its economic development performance has not been sterling. The annual economic growth rate of 2.6% for 2000–17 was much lower than the 4.5% per annum average for the group of upper middle-income countries. Considering that the economy grew by only 2.6% annually from 1970 to 2017, the GDP growth target of 4–5% a year will be a stretch. To achieve this target, Fiji must adopt a high-productivity growth strategy.

The APO initiative to assist the Republic of Fiji in developing the National Productivity Master Plan is aimed at achieving average annual productivity growth of 4–5% during 2020–36 to quadruple the nominal per capita income or to double the real per capita income, as stated in its 20-Year Development Plan 2017–2036. Besides the quantitative target, the master plan includes five qualitative goals and defines 12 strategic thrust areas to achieve the five goals in addition to alignment with the UN Sustainable Development Goals.

The master plan for Fiji, developed from January to April 2019, is intended to boost the country's productivity by improving the policy framework, ensuring optimal mechanisms for the national productivity movement, and aligning efforts with long-term development goals. The consultancy project was executed under a special cash grant from the Japanese Ministry of Foreign Affairs and conducted in collaboration with the NTPC as well as the Ministry of Employment, Productivity and Industrial Relations over a four-month period.

The five qualitative goals are: productive, agile enterprises making efficient, effective use of resources; high value-added sectors located in the high end of the product space; a broad economic base with high value-added industries; robust business enablers propelling enterprise and sectoral growth; and advanced macro enablers underpinning sustained productivity growth.

Development of a National Productivity Master Plan for Lao PDR

Lao PDR has demonstrated robust economic growth in the past decade, but it was mainly driven by large infrastructure projects, power generation, and the service sector. Although the rate of economic growth averaged 7.7% during the past 10 years, that was the result of exploiting natural resources, notably hydro resources, with increasing strains on the environment. The Government of Lao PDR has been seeking more diversified, sustainable growth strategies since the launch of its Vision 2030 and Socioeconomic Development Strategy 2016–2025 in April 2016. Political stability, reduction of poverty, efficient use of natural resources, and integration into the ASEAN community have been the main focus areas. To support its vision and strategy, the Lao PDR government requested the APO to undertake a policy advisory project to lay the foundations for productivity-driven economic growth.

The objective of the consultancy project on the Development of the Lao PDR National Productivity Master Plan is to enhance socioeconomic development through a nationwide high-productivity growth strategy. This project will not only analyze the current productivity status but also propose future targets, strategies, and policy tools to achieve national targets. The final document will include productivity enhancement plans for all ministries, relevant

agencies, and other stakeholders in Lao PDR over a 10-year time frame (tentatively FY2021–30). A major emphasis will be institutionalizing and strengthening the productivity movement and its supporting ecosystem.

The preliminary planning phase of the consultancy project commenced in December 2019, with completion planned for August 2020. A research team from the Korea Development Institute will collaborate with a national task force formed by the Laotian government which comprises representatives of 18 key agencies, ministries, and organizations. The first consultation meeting was to be held in Vientiane in April 2020.

Institutional Capability Development Plan for the Mongolian Productivity Organization

In addressing institutional needs and building the capability of NPOs with the objective of generating effective productivity-related strategies and programs implemented at the national level, the APO undertakes consultancy services. The goal is to prepare recommendations to help NPOs review strategies, organizational structure, infrastructure, funding models, staffing, approaches to governance, leadership, human resources, services and programs, business activities, operations and systems, etc. The efforts include benchmarking against more advanced NPOs to illustrate how progress can be made.

The MPO was the first NPO to participate in the APO's institutional capability development initiative. The project's methodology and coverage consisted of five steps: 1) obtaining an understanding of the key challenges and opportunities for the MPO, including a comparison of Mongolia's performance with other APO member countries and globally in terms of 28 international key performance indicators; 2) a visit by an APO-assigned consultant to gain firsthand information on the MPO's capabilities, activities, and current and potential role in driving and/or supporting productivity and economic development within Mongolia; 3) preparing a draft report of the findings and recommendations; 4) obtaining feedback on the draft report from the APO Secretariat and MPO; and 5) finalizing the report based on the feedback received.

The visits to Mongolia for data collection, meetings with relevant stakeholders, and obtaining preliminary feedback were conducted 10–17 August and 30 September–5 October by a consultant on organizational excellence from New Zealand. The project ran from August to October 2019, and 18 stakeholders from Mongolian public, private, and civil society organizations were involved in the consultation phase.

One of the key recommendations was the need for the MPO to reposition itself to address more strategic issues at higher levels of the decision-making hierarchy. This would assist the MPO in securing government-wide support for national or public-sector productivity initiatives rather than being limited in scope when positioned under one ministry. The plan was handed over to the head of the MPO by the APO Secretary-General on 28 January 2020 and will be referred to when devising specific strategies for its implementation.

Training of Trainers on Strategic Foresight and Scenario Planning

Strategic foresight refers to an organization's capacity to think systematically about the future to inform decision making today. Strategic foresight can be developed by employing and institutionalizing tools such as scenario planning. Through these tools, planners may anticipate opportunities and threats occurring in the near and distant future and develop appropriate, robust strategic responses to those possibilities. Scenario planning involves developing, in a rigorous, structured way, several plausible "stories" about the future. The scenarios are then used to develop strategic options and initiatives that are future-ready.

To help improve the planning and strategy development processes, the APO in cooperation with the DAP organized a Training of Trainers in Strategic Foresight and Scenario Planning. The course was held 16–20 August 2019 in Metro Manila with 26 participants from various Philippine government agencies spanning policy areas including labor and employment,

science and technology, national development planning, etc. The course was conducted by resource person Jonathan Star, Principal of Scenario Insight LLC, Fairfax, CA, USA.

Program coverage: Principles of strategic foresight and scenario planning; Defining focus and developing framing questions; Horizon scanning; Creating scenario building blocks; Strategic storytelling; Identifying strategic options; Designing meetings; Communicating scenarios; and Practical applications.

Development of Vietnam's National Productivity Master Plan: Toward Innovation-driven Economic Growth

Today's rapidly changing environment requires faster responses and enhanced product and service delivery. To assist APO member countries in achieving higher labor productivity and economic competitiveness, a shift in focus is required. National productivity initiatives must pay more attention to macro issues such as economics, human resources, and institutions, while focusing on the specific context of each member country.

At the time of writing, the APO was carrying out a consultancy project to propose policy options for the Government of Vietnam to boost national productivity. Vietnam has achieved remarkable growth since the launch of economic reforms in the late 1980s. It began industrialization by focusing on labor-intensive light manufacturing and rapid integration into the global market. The strategy was very successful in jump-starting productivity growth and reducing poverty. Entering the 2000s, however, labor productivity growth began to slow and to rely more on capital deepening than on efficiency improvement. Whether it will be able to continue its course toward becoming an advanced economy is a question of considerable importance not only to Vietnam but also to countries that see its great potential as a trading partner.

A consultancy project to develop a national productivity master plan for Vietnam started in November 2019, and the final plan was scheduled for delivery by June 2020. A team of researchers from the Korea Development Institute was working closely with the VNPI and other key nationwide stakeholders in areas such as science and technology, R&D, state-owned enterprises, education and technical and vocational training, and SMEs. The ultimate objective is to assist Vietnam in boosting economic development through the identification of factors affecting productivity and enhancing the national innovation system to sustain productivity gains. The first consultation meeting was held in Hanoi, 25–28 November.

APPENDIX 3

List of NPOs

BANGLADESH

National Productivity Organisation, Ministry of Industries

CAMBODIA

National Productivity Centre of Cambodia, Ministry of Industry and Handicraft

REPUBLIC OF CHINA

China Productivity Center

FIJI

National Training and Productivity Centre, Fiji National University

HONG KONG

Hong Kong Productivity Council

INDIA

National Productivity Council

INDONESIA

Directorate General of Training and Productivity, Ministry of Manpower

ISLAMIC REPUBLIC OF IRAN

National Productivity Organization of the Islamic Republic of Iran

JAPAN

Japan Productivity Center

REPUBLIC OF KOREA

Korea Productivity Center

LAO PDR

Lao National Productivity Organization, Department of Small and Medium Enterprise Promotion, Ministry of Industry and Commerce

MALAYSIA

Malaysia Productivity Corporation

MONGOLIA

Mongolian Productivity Organization

NEPAL

National Productivity and Economic Development Centre

PAKISTAN

National Productivity Organization

PHILIPPINES

Development Academy of the Philippines

SINGAPORE

Singapore Productivity Centre

SRI LANKA

National Productivity Secretariat, Ministry of Public Administration and Disaster Management

THAILAND

Thailand Productivity Institute

TURKEY

Ministry of Industry and Technology
(Joined in March 2020)

VIETNAM

Vietnam National Productivity Institute

APPENDIX 4

Abbreviations and Acronyms

3Rs	Reduce, reuse, recycle
AEPM	Asian Economy and Productivity Map (of the APO)
AI	Artificial intelligence
APO-AB	APO Accreditation Body
ATF	Agriculture Transformation Framework (of the APO)
B&Bs	Biofertilizers and biopesticides
BE	Business excellence
BoP	Base of the pyramid
CB	Certification Body (of the APO)
CBD	Certification Body Development (of the APO)
COA	Council of Agriculture (of the ROC)
COE	Center of Excellence
CPC	China Productivity Center
CPS	Cyberphysical system
DAP	Development Academy of the Philippines
DLT	Distributed ledger technology
DOSMEP	Department of Small and Medium Enterprise Promotion, Lao National Productivity Organization
DPP	Development of Productivity Practitioners
EU	European Union
FDS	Food supply and distribution
FRA	Future Readiness Award (of the APO)
FSQI	Food safety, quality, and innovation
FTPI	Thailand Productivity Institute
FVC	Food value chain
GAP	Good Agricultural Practices
GBM	Governing Body Meeting (of the APO)
GDP	Gross domestic product
GP	Green Productivity
GRP	Good Regulatory Practices
ICT	Information and communication technology
IIoT	Industrial Internet of Things
IoT	Internet of Things
IPM	Integrated pest management
ISO	International Standardization Organization
IT	Information technology
JPC	Japan Productivity Center
KPC	Korea Productivity Center
LPM	Long-term productivity measure
M&E	Monitoring and evaluation
MFCA	Material flow cost accounting
MFP	Multifactor productivity
MPC	Malaysia Productivity Corporation

MPO	Mongolian Productivity Organization
MSME	Micro, small, and medium-sized enterprise
NGO	Nongovernmental organization
NPC	National Productivity Council (of India)
NPCC	National Productivity Centre of Cambodia
NPEDC	National Productivity and Economic Development Centre (of Nepal)
NPO	National productivity organization; National Productivity Organisation (Bangladesh); National Productivity Organization of IR Iran; National Productivity Organization (Pakistan)
NPS	National Productivity Secretariat (of Sri Lanka)
NTPC	National Training & Productivity Centre, Fiji National University
OECD	Organisation for Economic Co-operation and Development
PDB	Productivity Database (of the APO)
PDF	Program Development Fund (of the APO)
RFID	Radiofrequency identification
RMS	Regulatory management system
SGPC	Singapore Productivity Centre
SM	Smart manufacturing
SME	Small and medium-sized enterprise
SOPs	Standard operating procedures
STI	Science, technology, and innovation
STIP	Science, technology, and innovation policy
TFP	Total factor productivity
TWG	Technical working group
VNPI	Vietnam National Productivity Institute
WHO	World Health Organization (of the UN)
WSM	Workshop Meeting of Heads of National Productivity Organizations

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