APO NEWS
Information to Make a Difference in Productivity

APO certifying productivity practitioners from 2015

The development of certified productivity practitioners is a high-priority need for NPOs. Based on that need, the APO devised the Development of Productivity Practitioners: Basic and Advanced (DPP: Basic and Advanced) courses. In 2013, the APO Secretariat hosted an expert meeting to explore the feasibility of developing a certification system. In 2014, DPP: Basic, implemented by the Development Academy of the Philippines, and DPP: Advanced, implemented by the Malaysian Productivity Corporation, were selected for the pilot certification scheme starting from 2015. Certification involves three stages:

Stage 1: All potential participants in the face-to-face DPP: Basic and Advanced training courses must first enroll in and pass the self-learning e-courses on the same subject. The self-learning e-courses are available on the APO e-learning website (http://www.apo-elearning.org/moodle19/).

Stage 2: After passing the examination, participants in the face-to-face courses carry out productivity improvement assignments in their countries within three to six months.

Stage 3: The participants submit project reports on productivity enhancement (PREP) to the APO Secretariat for review, and a registration-based certificate is given to successful ones. All APO-certified productivity practitioners are registered on the APO website.

Certification stage 2 face-to-face course participants engrossed in their individual assignments.

The certified practitioners will be able to identify, use, and explain basic productivity tools and other approaches to improve productivity; adopt an integrated framework to diagnose productivity problems and develop and implement solutions; and provide training, consulting, and promotional services to NPO clients. Those certified must be able to diagnose the current productivity performance of any organization and then adopt and implement appropriate solutions for improvement. Therefore, NPOs only nominate emerging professionals expected to work as productivity practitioners and who can submit PREP (for basic guidelines and application forms, go to http://www.apo-tokyo.org/wedo/Certified).

So far, 20 participants from 14 APO members have applied for certification. While all passed the self-learning e-course (stage 1), one failed stage 2. Therefore 19 are in stage 3 and working hard on their projects. Thirteen APO resource speakers/experts for DPP: Basic and Advanced courses have been recognized by the APO as honorary certified productivity practitioners, and their profiles can be accessed at http://www.apo-tokyo.org/wedo/Certified/roster-of-apo-certified-productivity-practitioners/.

"With the APO certification scheme, the 'new face' of the DPP: Basic course makes it even more exciting this year," enthused productivity consultant and APO-certified productivity practitioner Nina Maria Estudillo from the Philippines. APO Senior Program Officer K.D. Bhardwaj noted that, "This scheme will expand to cover other areas, creating a widely recognized APO certificate brand."

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Improving product quality using design for Six Sigma: an Indian case study

This case study was conducted at Swaraj Division of Mahindra & Mahindra, a 2012 Deming Prize-winning company. It has remained at the top position in the Customer Satisfaction Index (CSI) in the tractor industry for the last three consecutive years. To maintain its CSI position and achieve the organizational vision of improving market share in 2015–2016, one of the key focus areas is to improve product quality by solving chronic issues. The company therefore sponsored an executive from the R&D Division, Deputy General Manager (Design) J.S. Sohal, to attend Six Sigma Black Belt training at the PTU Nalanda School of TQM & Entrepreneurship and equip him with the methodology and advanced tools for building quality into the product at the design stage. He was mentored by the author of this column, who is a Master Black Belt in Six Sigma, to solve the chronic problem of early-hour failures of hitch control valves (field failures occurring between 0–250 hours of tractor running) using define-measure-analyze-design-optimize-verification (DMADOV) methodology. This case demonstrates that if we follow improved methodology rigorously and appropriate quality tools are used, we can reap immense benefit on a recurring basis.

Define phase: selection and definition of problem

Among all failures due to hydraulics in Swaraj tractors, those in hitch control valves are the most common. Six-month data showed that the average in-house rejection rate for hitch control valves was 3.2%, costing the company US$40,000 annually. This high internal rejection was also reflected in external failures. Early failures of tractors are most damaging to customer satisfaction. Warranty costs during early-hour failures are more than 50% of the total warranty amount.

A Six Sigma project team was formed and set the goal of reducing in-house rejections by 50% (from 3.2% to 1.6%) by June 2014, thus contributing $20,000 directly to the bottom line of the company annually. It also estimated that this reduction in internal failures would stop 80% of early failures.

Measure phase: establishing baseline

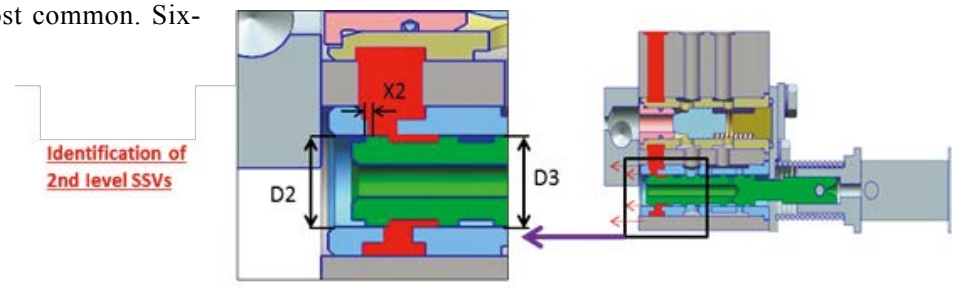
The team recorded the trend of internal failures as well as failures at the supplier end of control valves for the period 12 February to 13 August. The baseline figure for internal failures was 3.2% expressed as rejections per hundred units (RPH) and that for the supplier end was 9%. Field data showed that there were 332 early field failures attributed to hitch control valve failure during the period among the 72,083 units in the field, i.e., 5,396 parts per million.

Further analysis showed lift dropping is a critical-to-quality parameter of hitch valves. A lift drop of more than 10 mm in 3 minutes is considered as failure of the control valve. From past experience, the team was aware that it occurs because of oil leakage inside the valve.

Analyze phase: identifying key design parameters

The team studied the construction of the control valve to identify defective components. It was concluded that any variation in the design parameters of the three major parts, the spool valve, spool sleeve, and control valve housing, could lead to oil leakage which in turn leads to lift dropping.

The team identified the design parameters, as shown in Figure 1. Thirty control valves were selected randomly and regression analysis between their design parameters (Xs,



Design parameters	Description
X1=D3-D4	Clearance between spool & sleeve
X2=$X2_1$-$X2_2$	Spool overlap $X2_1$=Spool land-to-land distance (spool L/L) $X2_2$=Spool hole-to-hole distance (spool H/H)
X3	Surface finish of sleeve bore
X4	Taper in sleeve bore
X5	Ovality of sleeve bore in lowering zone
X6	Surface finish of sleeve O.D
X7	Taper/ovality in spool
X8	Surface finish of housing bore

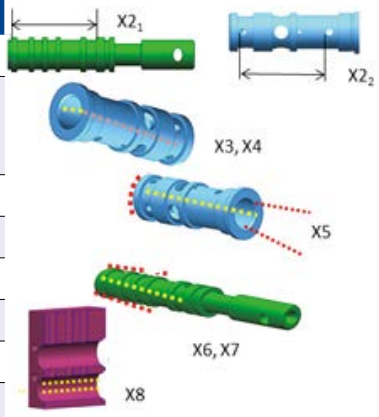


Figure 1. Design parameters of the hitch control valve.

causes) and lift dropping (Y, effect) was performed. It was concluded from the analysis that out of all the design parameters, four, i.e., clearance between spool and sleeve (X1), spool overlap comprising spool land-to-land (L/L) and spool hole-to-hole (H/H) distances ($X2_1 - X2_2$), and ovality of the sleeve bore (X5) contributed 90% to the total variation in lift dropping. These design parameters are controlling factors.

Design phase: designing parameters

The Six Sigma team proposed alternative values for these parameters, as shown in Figure 2. Based on full factorial design of experiments (DoE) at two levels, the existing and proposed levels for four parameters, 16 experiments (2^4) were conducted. Four sets of experiments were conducted at median values, i.e., the average of existing and proposed values. Experiments were replicated to capture variations with the same design. At the proposed levels, lift drop was significantly lower, and therefore a design modification was proposed. The results are shown in Figure 2.

Control factor	Level 1 (existing level)	Level 2 (proposed level)
X1 (µm)	10	6
$X2_1$ (mm)	50.5	51.1
$X2_2$ (mm)	50.0	49.8
X5 (µm)	2	4

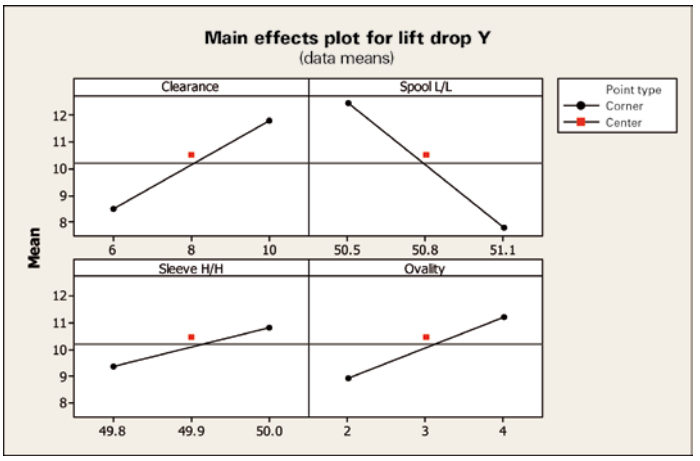


Figure 2. Results of DoE.

Optimization phase: optimizing results

For design optimization, a global solution of all four parameters, i.e., clearance, spool L/L, spool H/H, and ovality, were computed using a response optimizer and contour plots with Minitab software. However, the manufacturability of the parameters at the proposed tolerances was a major challenge. Before rolling out the new design, it was decided to improve the capabilities of the related manufacturing processes such as honing, drilling sleeve cross holes, and heat treatment.

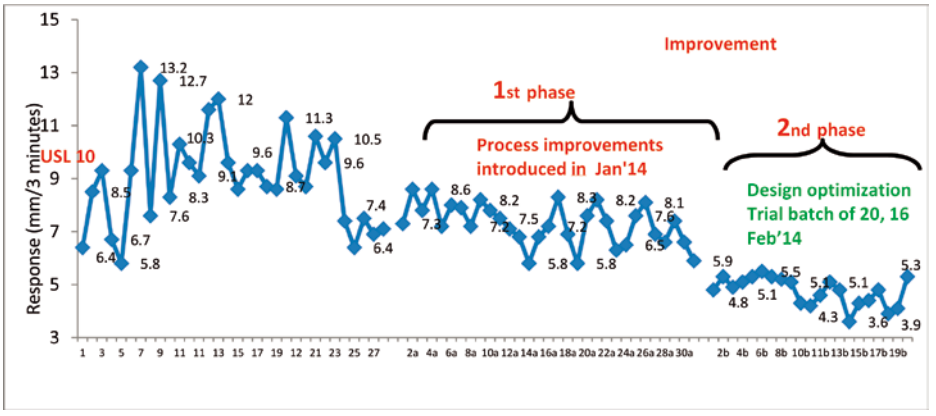


Figure 3. Improvement in lift drop.

Verification phase: results

After implementation of process and design improvements, the magnitude of response (lift drop) and its variations were reduced significantly, as shown in Figure 3.The RPH rate (on the production line) was also reduced significantly, as shown in Figure 4.

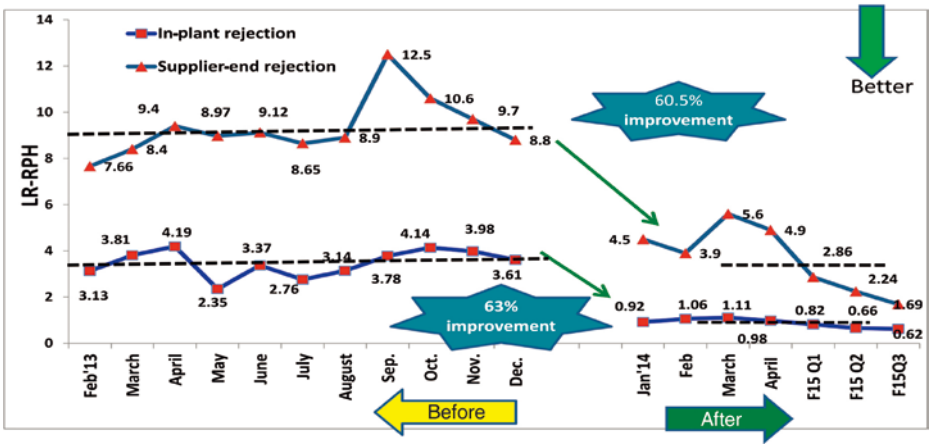


Figure 4. Reduction in the RPH rate before and after manufacturing process redesign.

Benefits

The Swaraj Division reaped the following benefits from applying the DMADOV methodology of Six Sigma to issues in its tractor hitch control valves:

- Rejections at the supplier end were reduced from 9% to less than 4%.

(Continued on page 6)

Advanced agribusiness management course

Agribusiness companies in APO members face tremendous challenges in the complex globalized environment. They must compete with technologically advanced, well-financed, networked multinational agribusinesses, mostly of Western origin. They also need to develop value chains that take into consideration the sociopolitical environment in the region, changing consumer behavior, and climate extremes. Innovation in business operations and product development is an indispensable element in their strategies. Under an MOU signed by the Cornell International Institute for Food, Agricuture, and Development (CIIFAD) of Cornell University, New York, in 2014, the APO, CIIFAD, and Thailand Productivity Institute jointly organized the Advanced Agribusiness Management Course for Executives and Managers in Bangkok, 20–24 July.

The course was attended by 25 participants from 14 member countries. Resource persons from CIIFAD, the Malaysian agribusiness sector, and UN FAO were assigned by the APO, in addition to three assigned by CIIFAD, comprising one each from its staff, the German Development Institute, and a private Cambodian agribusiness. Their broad-based knowledge of global agribusiness, its interlinked value chains, and how to incorporate innovation in management in SMEs in the sector led to animated discussions. Multiple participants, including Dr. Iraj Saleh of IR Iran, commented on the usefulness of SWOT analysis in agrifood marketing efforts. Samorn Channa of Cambodia agreed and suggested that a future course could focus on organic agribusinesses. On the final day of the course, the poultry division of B. Food Products International, part of the Betagro Group, hosted a site visit and explained the process of innovation which had increased its market share.

Experts during a panel discussions facilitated by Fostat President Darunee Edwards (far right).

Benchmarking of local governments for improving service delivery and productivity

The first APO workshop on Benchmarking of Local Governments (Municipal Level) for Improving their Service Delivery and Productivity was organized in association with the Directorate of Productivity and Entrepreneurship (NPO Indonesia), 10–14 August, in Semarang, Central Java, to discuss productivity issues faced by local governments, prepare a benchmarking index for them, and draft action plans for local government benchmarking in participating countries. Central Java Governor H. Ganjar Pranowo, Vice Governor H. Heru Sudjatmoko, and Ministry of Manpower Director General and APO Country Director for Indonesia Khairul Anwar welcomed APO participants at the inaugural session. Three resource speakers from Canada, India, and Sri Lanka supported the workshop.

A presentation by CEO of the Central Java Regional Domestic Investment Agency Sujarwanto Dwiatmoko on the roles and responsibilities of the agency in enhancing productivity in the province. Photo courtesy of NPO Indonesia.

Twenty high-ranking local government officials and managers from 12 member countries attended the workshop and exchanged knowledge and experience on common measurement tools; methods for local governments to measure citizen satisfaction; best practices in results-based performance management in local government authorities; the Ontario Municipal Benchmarking Initiative; best practices in service improvement plans for local government; strategies for improving efficiency, effectiveness, and performance; best practices in waste management systems; and best practices in continuous improvement.

The participants made visits to view the best practices of innovation and citizen service improvement of Semarang Municipal Council and small industry development activities with the support of the Board of Investment, Central Java. Other visits were hosted by the Small Industries Department to explain local government support for SME development and batik industries. Participants and resource speakers alike were favorably impressed by local government involvement in provincial socioeconomic development.

p-Tools
Productivity methodologies, tools, and techniques

Integration of management systems: an evolution

What is a management system?

According to ISO 9000:2005, a "management system" is defined as "a set of interrelated or interacting elements to establish policy and objectives as well as to achieve those objectives." Management system standards are based on the Deming plan-do-check-act cycle. Organizations "plan" by identifying how they are affected by internal and external factors, developing objectives and formulating action plans to achieve them. They "do" by ensuring the competence of people, maintaining equipment, ensuring accurate measurements, and, most importantly, controlling operational processes, their own or subcontractors'. Organizations "check" by monitoring and measuring their performance, like products, processes, resources consumed, waste produced, and number of occupational health and safety (OHS) incidents. At system level, organizations evaluate compliance with obligations and conduct internal audits to determine conformity with the requirements of the management system.

Organizations "act" to correct nonconformities, identify their root causes, and eliminate them. They also "act" by analyzing measurement data, drawing conclusions on what worked and what did not, and reviewing the performance of the entire management system. Finally, organizations "act" by deciding what to improve next in a "management review."

Quality management systems

"Quality" can be defined as "fitness for purpose." In the 3rd edition of ISO 9001 in 2000, quality was defined as the "degree to which a set of inherent characteristics fulfill need or expectation that is stated, generally implied, or obligatory." Earlier versions of ISO 9001 focused on quality assurance, where conformity with contractual requirements and product specifications was the aim. The standard writers of Technical Committee (TC) 176/Subcommittee (SC) 2 introduced eight quality management principles, such as the process approach and continual improvement.

The purpose of ISO 9001 is to support organizations in demonstrating their ability to provide products meeting customer, statutory, and regulatory requirements consistently, while enhancing customer satisfaction through effective application of the standard. Examples of the latter include processes for continual improvement and assurance of conformity.

Environmental management systems

The arrival of the Industrial Revolution led to massive consumption of natural resources and generation of unprecedented amounts of waste. Humans did not realize their profound impact on the earth, until serious problems occurred. The purpose of an environmental management system (EMS) is to help organizations achieve and demonstrate sound performance by controlling the environmental impacts of their activities, products, and services, consistent with their policy and objectives and taking into account compliance obligations. Prior to the publication of the first edition of the ISO 14001 EMS standard in 1996, there were national standards such as the EMAS in the UK and sector standards such as those in the oil and gas industry.

OHS management systems

OHS management systems have an internal focus, the well-being of people, including employees, subcontractors, and even visitors. Various types of hazard exist in the workplace: physical (e.g., electricity); chemical (toxic substances); biological (viruses); psychological (stress); physiological (needs of the human body); and ergonomic (man–machine interface). An OHS management system is meant to control risks and improve OHS performance by identifying hazards, conducting risk assessments, and determining the necessary controls such as elimination, substitution, engineering controls, administrative controls, or personal protective equipment.

Integration

All management system requirements should be seamlessly integrated with the daily activities of an organization. Some organizations end up with more than one management system, i.e., a quality management system, a differently structured EMS, and another system for OHS. This could be a source of frustration and inefficiency. The preference for integration is obvious, with the resulting unity of command, efficiency, and consistency. Generally, there are three levels: integrated policy alone; integrated policy and system procedures such as documentation control, internal audits, and corrective actions, although operational procedures are not integrated; and fully integrated policy, system procedures, and operational procedures.

Annex SL

Presently, ISO 14001 and OHSAS 18001 have similar

structures, with requirements included in clauses 4.1 to 4.6. ISO 9001, however, has requirements under clauses 4 to 8. The different structure and at times slight differences in definitions have not facilitated the integration of management systems in different disciplines. ISO senior management has developed a common structure for a new generation of standards, included in the ISO/IEC Directives, Part 1, Consolidated ISO Supplement—Procedures specific to ISO, third edition, 2012, as Annex SL (Annex SL).

Annex SL covers "Proposals for management system standards." However, it also includes three "normative" (meaning mandatory) appendices: Appendix 1, Justification criteria questions; Appendix 2, High-level structure, identical core text and common terms, and core definitions for use in management system standards; and Appendix 3, High-level structure, identical core text, common terms, and core definitions. The high-level structure consists of 10 elements. In the high-level structure, Annex SL introduces concepts such as "context of an organization," i.e., where an organization is obliged to determine internal and external factors that could affect its quality, environmental, or OHS performance within the integrated management system (IMS). Another important concept introduced in Annex SL is "risk-based thinking." Organizations should determine risks that need to be addressed to ensure that the IMS can achieve its intended results, enhance desirable effects, prevent or reduce undesired effects, and achieve continual improvement.

New generation

Based on the Annex SL high-level approach, both ISO/TC 176/SC 2 and ISO/TC 207/SC1 have been reviewing ISO 9001 and ISO 14001. It is expected that the Final Draft International Standard (FDIS) for ISO 9001 will be published in July 2015, with the ISO 14001 FDIS to follow. Even though OHSAS 18001 is an international standard, it is not an ISO standard yet. ISO/PC 283 was established in 2013 to develop an ISO OHS management standard to be known as ISO 45001. ISO 45001 will be based on the Annex SL structure. The standard is now in the Committee Draft stage and it is expected to be published in 2016.

The way forward

Many organizations start their ISO 9001 journey based on customer certification requirements. With increasing hands-on experience, management as well as staff involved realize the infinite potential of the ISO 9001 system and how it can be a management control platform to support and improve organizational performance at various levels. The IMS is another step forward as an effective tool to facilitate process control, prepare for emergencies, and ensure consistency. Top management should view IMS adoption from a long-term strategic perspective, not as a bid to be on a client's tender list.

Ng Ha Wai, Howie is an international adviser and lead tutor/lead auditor in ISO management systems. He is a member of the ISO/TC 176/SC 2, ISO/TC 34/SC 17, and ISO/PC 278 and has been active as a resource person for the APO. Mr. Ng's career started in General Electric and progressed through the career ladder in Motorola, Philips, and Whirlpool. He received a BSc (Eng.) and MSc (Eng.) from the University of Hong Kong, and an MBA from York University (now Schulich School of Business) in Toronto, Canada.

Improving product quality using design for Six Sigma: an Indian case study

(Continued from page 3)

- The in-plant RPH rate was reduced from 3.2% to 1% by June 2014.
- The average number of reworks/day decreased from 8.75 to 2.87.
- Financial savings to the tune of $30,000 were made due to fewer internal rejections.

Naresh Chawla holds a postgraduate degree in engineering and is an APO-certified Productivity Practitioner with abundant experience in consulting and training in industrial engineering, quality management, and operational excellence. He served as Deputy Director of the NPC, India, for 15 years. Naresh is a Six Sigma Master Black Belt and lean manufacturing consultant with the NPC while spearheading programs on Six Sigma certification and lean manufacturing in various organizations as General Manager (Consultancy and Training) of the PTU Nalanda School of TQM and Entrepreneurship in Mohali, India.

New officer at the Secretariat

On 1 July, Hikaru Horiguchi started in his position as Senior Program Officer at the APO Secretariat in the newly created Energy Efficiency Program (EEP) under a special cash grant from the Japanese Ministry of Economy, Trade and Industry (METI). The overall aim of the EEP is to train trainers who can lead EE initiatives and build up pools of EE practitioners in five selected APO member countries: Bangladesh; Mongolia; Nepal; Pakistan; and Sri Lanka. As a first step, Horiguchi is fine-tuning the details of the EEP and developing training modules, while conducting research and engaging in discussions with the Energy Conservation Center of Japan and others. He commented, "I'm mainly in charge of the EEP, but based on my various working experiences in the Japanese government, I'd like to contribute to other APO activities as well."

Born in Tokyo, Horiguchi is a graduate of the Faculty of Engineering, University of Tokyo, who majored in IT. He was previously seconded to the Board of Audit of Japan as a technical counsellor in the General Executive Bureau. Prior to that, he was the director-general of Planning Headquarters, National Institute of Advanced Industrial Science and Technology, the largest public research institute in Japan; served in the Chicago office, Japan External Trade Organization; and held various positions in METI related to IT, manufacturing, and services. Horiguchi has achieved the highest ranking in *shogi* (Japanese chess) and enjoys playing online since face-to-face opponents are hard to find at that level. Married with a primary school-aged son and daughter, most of his weekends are spent looking after the energetic pair.

Announcement: WSM

56th WSM to convene in Singapore

The 56th Workshop Meeting of Heads of National Productivity Organizations (WSM), the APO's annual program planning exercise, will be held in Singapore, 20–22 October 2015.

The agenda for the WSM will include the adoption of the evaluation of 2014 projects, reconfirmation of the APO Program Plan for 2016, and discussion of the new APO Program Plan for the 2017–2018 biennium.

Positions open at the Secretariat

The APO Secretariat is seeking highly qualified candidates for the following positions:

- Program Officer
- Information & Public Relations Officer
- Project Assistant

Candidates must have demonstrated competency in a similar role or field, have a strong sense of responsibility as well as a comprehensive strategic viewpoint, and be enthusiastic about improving productivity in the Asia-Pacific region. We welcome those with experience in the productivity movement who enjoy working with various nationalities from different cultural backgrounds. Candidates must be citizens of APO member countries. Interested candidates are invited to visit the APO website at http://www.apo-tokyo.org/careers/ for detailed information on the positions open, instructions on how to apply, and deadlines. Applications must reach the APO Secretariat by the designated deadline via postal mail or e-mail. Only those who are shortlisted will be contacted. Application documents will not be returned.

For general inquiries, please contact:
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Photo news

A mission from the Department of Antioquia, Colombia, visited the Secretariat on 19 August. APO Secretary-General Mari Amano welcomed the delegates, and Department Directors introduced them to organizational activities. (L–R) Embassy of Colombia in Japan Communications Attaché Paula Esguerra, Economic Development of Antioquia Province Secretary Tomás Cipriano Mejía, and Center for Science and Technology of Antioquia Productivity Division Director Jaime Arboleda Palacio.

Youth employment issues

Youth are the potential and future of every country, and productive young people are the architects of a healthy, growing economy. A common concern of many governments nowadays is finding the best ways to integrate young people into the labor force as an increase in youth unemployment will have seriously negative effects on national economic growth and productivity.

The APO in cooperation with the National Iranian Productivity Organization (NIPO) held a four-day workshop on Youth Employment Issues in APO Economies, 2–5 August, in Tehran. Twenty-two participants representing 12 member countries and nine observers attended. This was the first time a workshop on focusing specifically on issues of youth employment was organized. Two resource persons from Japan and Singapore, countries with effective policies to keep the youth unemployment situation in check, were assigned to facilitate the proceedings.

After updates on national youth employment trends and challenges facing productivity, participants eagerly shared effective policies on youth entrepreneurship, education, and training; minimum wages for the young; and youth labor demand to address employment issues they had encountered. In addition to noting initiatives from other countries to suggest to their governments, participants also offered ideas for the APO Secretariat to examine in-depth in future research. On behalf of all participants, A. Rahim Bin Abdul Razak of Malaysia gave a vote of thanks for the timely workshop and reiterated their suggestion for the APO to carry out a future study to measure the impact of youth unemployment on productivity. He also pointed out the necessity of devising a universal framework to collect youth labor market information.

A site visit to the Iran Small Industries and Industrial Parks Organization showcasing how a job creation policy is implemented to reduce youth unemployment. The young man wearing black in the foreground is becoming skilled in manufacturing automotive brakes. Photo courtesy of NIPO.

GP and the 3Rs

The APO has promoted Green Productivity (GP) since 1994. The 3Rs (reduce, reuse, recycle) are an important GP tool for resource conservation/minimization of waste and adopted worldwide as an easy, effective method to protect the environment. Projects on the 3Rs have been organized by the APO since 2006.

Recognizing the role of the APO in promoting the 3Rs in the Asia-Pacific, the United Nations Centre for Regional Development (UNCRD) has invited Secretariat officers to participate in its annual regional 3Rs forums since 2010. Industry Department Senior Program Officer K.D. Bhardwaj attended the sixth, 17–19 August, in Male, Maldives. The theme was 3Rs as an Economic Industry: Next-Generation 3R Solutions for a Resource-Efficient Society and Sustainable Tourism Development in Asia and the Pacific. It was opened by Maldives Vice President Ahmed Adeeb Abdul Gafoor, with some 250 from 30 countries present. Bhardwaj moderated the Round Table on Economic Opportunities from the 3Rs and acted as a rapporteur for presentations on 3R developments. Other topics included exploring the 3R science-policy-business interface to turn waste into resources and provide economic opportunities at national and local levels. Supported by the Government of Japan, the forum was an opportunity to publicize APO activities in the 3Rs and GP.

Bhardwaj (R) during a panel discussion chaired by Bangladesh Minister of Industries Alhaz Amir Hossain Amu (3rd R). Photo courtesy of UNCRD.

Ninety-nine of 106 resorts in Maldives signed the Declaration by Resorts in Maldives for the Promotion of the 3Rs and Resource Efficiency towards Protection of the Local Environment and Marine Ecosystem. Tonga Minister of Environment Siaosi Ofa Ki Vahafolau Sovaleni led a mass planting of 300 trees on Hulhumalé Island, which made the forum carbon neutral.